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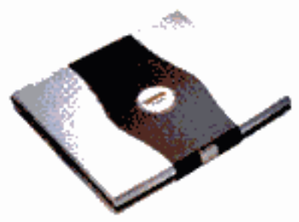

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APRIL 2001

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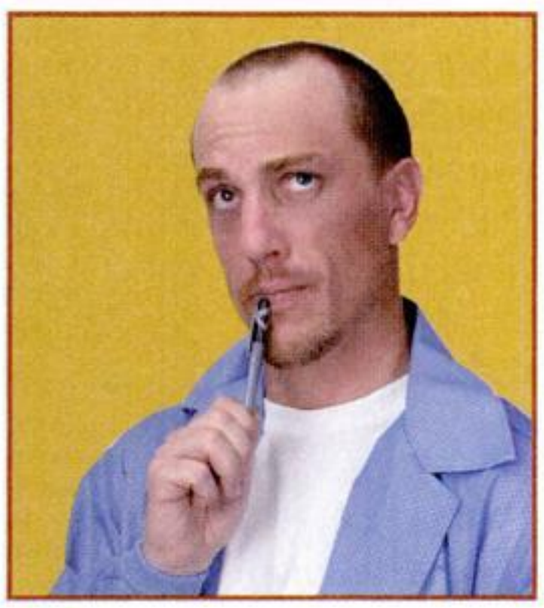
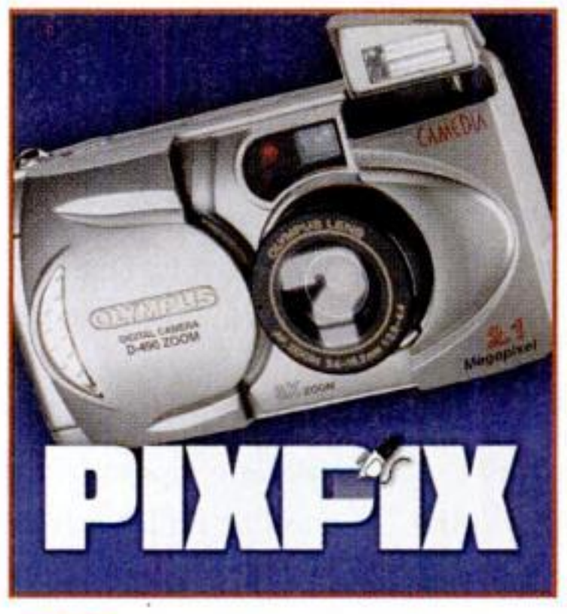
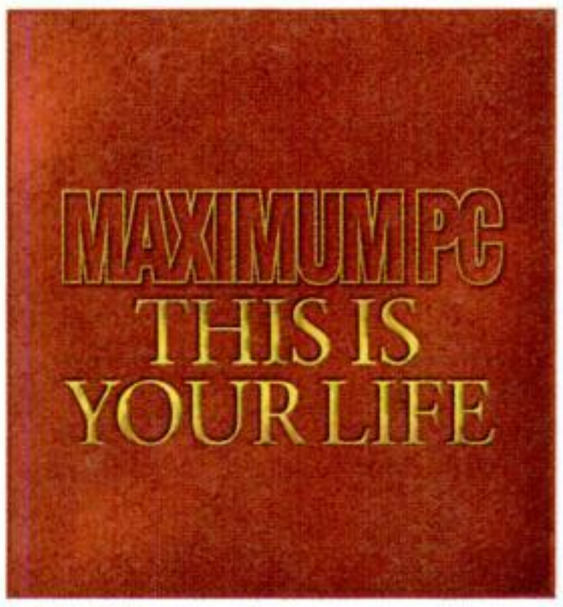


38 24 Best PC Tools



45 Tweak Your Digital Pics



53 Blasts from Our Past

FEATURES

30 GeWhiz!
It might be the most revolutionary 3D chipset in the history of the PC: nVidia's GeForce3 redefines gaming visuals.

38 Tools of the Trade
If you're still using a screwdriver that looks more like a shiv from Attica, check out our list of must-have PC lab tools.

45 Get Your Red Eye Out
Do your digi-pics look butt-booty ugly? Here are a bunch of tricks that'll make your images look like a pro shot them.

53 This Is Your (PC) Life
If you're doddering old fools like us, you'll remember your first Voodoo card and 2x CD-RWs. We detail the most significant PC products of the last five years.

TECH FILES

18 Watchdog
Consumer advocacy reports on Axis Systems, DSL purchasing, Webgear, 3dfx contingency plans, and Palm memory.

60 Lab Notes
Building a Pentium 4 box isn't like building just any old rig. Here are six steps to consider when bringing a P4 rig to life.

64 Ask the Doctor
Tweaking System Properties, disabling audio, and ditching UPS batteries.

COVER PHOTOGRAPHY BY AARON LAUER

PRODUCTS

23 Peripheral Vision
Q Drive lets you carry 64MB of storage on your key ring... IRdA is not dead and the XTNDAccess USB adapter proves it... The latest dorkphones from Plantronics are perfect for teleconferencing.

66 Reviews
Aberdeen's Claymore cuts benchmarks in half... **HP** Omnibook takes on **Toshiba** Portégé... **Intel**, **Asus**, and **MSI** offer Pentium 4 mobos... **Ace Computer** ships a budget Pentium 4 system... **Logitech**, **Boston Acoustics**, and **Altec Lansing** surround speakers go head-to-head... **Plextor** and **TDK** 16x CD-RW drives face off again... **Labtec** is no longer the joke of the speaker industry... **Kensington**'s track-ball does it all... **Linksys**, **D-Link**, and **Buffalotech** go wireless... **Adobe** *Premiere 6.0* hits the streets running... **Power Quest**'s *Partition Magic 6.0* divvies up your hard drive... **Innerloop** adopts a flight-sim engine for *Project IGI*... A trio of utilities promise to banish spying programs.

NEWS

14 Inside Sources
PC Previews, News, and Factoids
Mean green machine nVidia starts graphic war in notebooks... DVD burners finally come of age... Windows XP xplained... Juno asks what you can do for it... Intel mulls a socket change.

VOICES

6 Ed Word
Jon Phillips challenges the gaming industry to respond to the promise of the new GeForce3.

8 CommPort
Will the *Star Trek* uniform debate ever die? Quite frankly, no. We return to this matter and other burning issues in this month's episode of "Reader Mail."

25 Fast Forward
When your ISP goes belly-up, don't just stand there with your thumb up your nose. **Mr. Halfhill** prepares you for the day when your ISP dies.

27 Game Theory
Feeling blue over the glut of limp game titles for your new 1GHz machine? **T. Liam** offers a list of games that will float your boat.

On the cover:

- GeForce3.....30
- P4 Project 60
- PixFix 45
- Tools 38
- Notebooks 70

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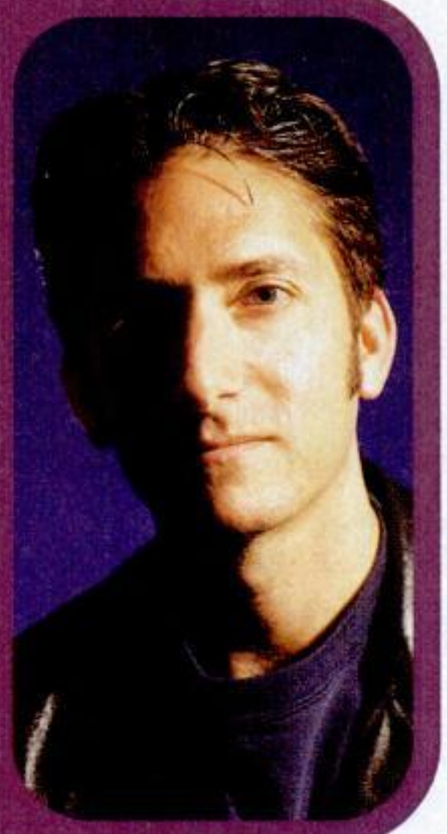

Dear game developers: Don't let us down. Don't cop out. Don't design games for Voodoo2-class systems when the most amazing 3D chipset the world has ever known is ready and waiting for your most challenging code.

I'm writing, of course, about nVidia's GeForce3, the 3D darling that graces this month's cover. We've evangelized next-gen 3D chipsets before, but the GeForce3 is special. It throws the traditional 3D pipeline out a 10th story window and provides game developers with the tools they need to define their *own* 3D pipelines. If that isn't an invitation to innovate, to strut one's most competitive game-developing skills, then I don't know what is.

I do know, however, that earlier chipsets of remarkable promise—such as all those that launched with support for hardware transform and lighting—have been underexplored by game developers. T&L was supposed to have given us games with much more complex models, but developers didn't jump on its bandwagon. Why? Because, aside from a few anomalies produced by Team Carmack, the game development community has always served a pathetically low common denominator. After all, you can't sell a slew of games if the machines of your target audience are too weak to run your code. That stated, even *Quake III Arena* fell behind the hardware performance curve. By the time it arrived, the best power-user systems could handle its complexity and then some.

The PC industry is in desperate need of, dare I say it, a "killer app" (this is a particularly precious term, but the precise clarity of its meaning is useful at times). In 1996, that killer app was the double-barreled combo of *GLQuake* and *vQuake*, the hardware-accelerated versions of *Quake* that could only run on 3dfx Voodoo and Rendition Verite cards, respectively. These patches showed the world just how awesome hardware acceleration tricks, particularly filtering, could be. And they compelled gamers to upgrade, upgrade, upgrade. I for one was crestfallen in early 1996 when then-Reviews Editor Andrew Sanchez told me I couldn't play *GLQuake* on my S3 Virge videocard. But I sucked up my chagrin and plunked down the dough for a Voodoo card. Since that pivotal event, I have upgraded regularly, if not a tad preemptively. Better safe than sorry, right?

Flash forward to 2001. PC sales flat-out suck. The average PC gamer—in other words, the average PC owner—isn't upgrading his hardware because he doesn't need to. But now the PC industry has a wonderful opportunity to practically force a new generation of upgrades. The visuals produced by the GeForce3 and its DirectX 8 compadres are so monumentally better than the status quo, gamers will be forced to upgrade just to "remain in the game." This scenario, however, only materializes if game developers do their part and raise the level of the common denominator. Will this happen? In fact, the future looks encouraging. Because Microsoft's Xbox employs an enhanced version of the GeForce3, ports from Xbox to the PC should be relatively pain-free. And because game developers won't have to pay Xbox licensing fees on their PC ports, they should be more than happy to make a few extra bucks on PC game sales.

The average PC gamer isn't upgrading his hardware because he doesn't need to.

Word to game developers: Return us to the excitement of 1996. And speaking of 1996: All this reminiscing inspired us to publish a five-year retrospective of *Maximum PC*'s favorite products. The tour begins on page 53. Here's to the past and an even more rewarding future.

—Jon Phillips

MAXIMUM PC

APR01 vol6issue04

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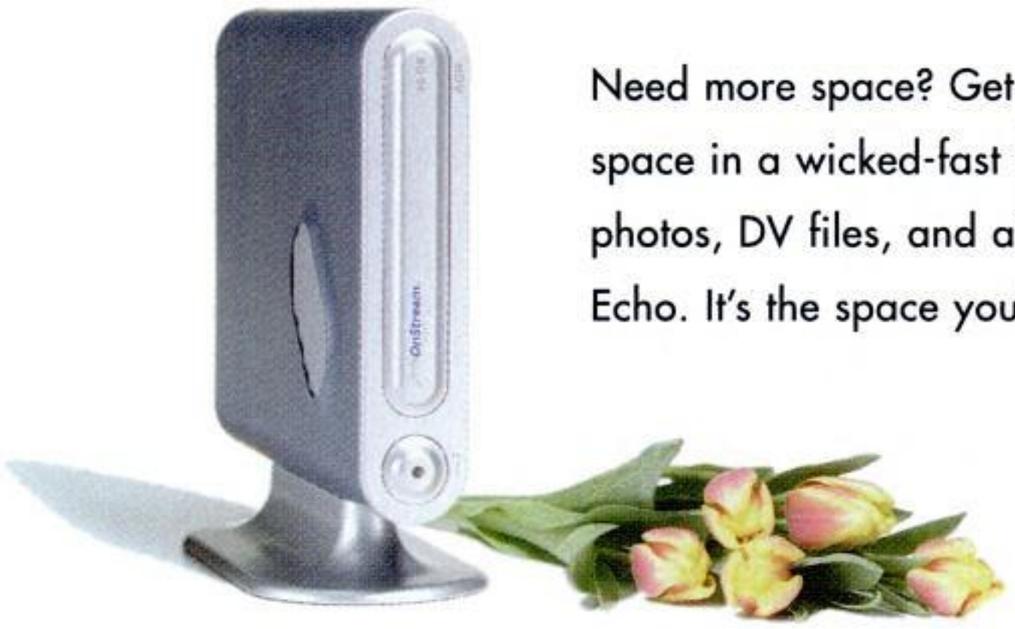

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Lian-Li Saves the Day

So what did we learn from our recent load o' reader letters? Well, we discovered that when *Maximum PC* has trouble identifying an unmarked component—like the case featured in a recent Polywell review—our readers are ready to save the day with the precise URL of where the component can be found (see page 10).. So thanks to everyone who gave us the specifics on the case from Lian-Li (and isn't that the name of one of the pandas at the National Zoo?). We also learned that the jury is split on our increased MP3 coverage. Many readers were stoked by our March cover story and told us so in letters of praise. A near equal amount of readers wrote to tell us that enough is enough: "MP3s, yes, we get it. Now let's return to the capacitor-level motherboard reviews."

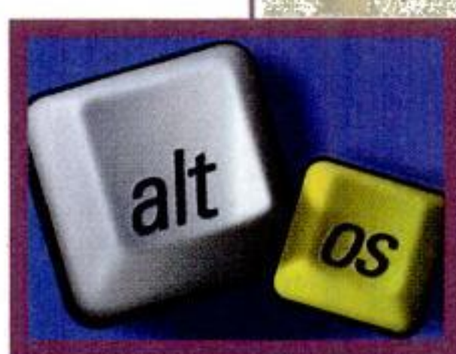
Moral of the story? The *Maximum PC* universe is big—and there's enough room in it for all of us.

Prime Misdirection

I totally love you guys and the huge amounts of useful information you push out each month, but I hate it when you make blatantly visible mistakes. In the March 01 CommPort, Gordon tells a semi-knowledgeable reader that in "Star Trek OG," the command staff does wear gold, and concludes that in the "first six movies, everyone just wears red." That is blatantly and undeniably wrong, wrong, wrong, wrong! In the very first Star Trek movie, *Star Trek: The Motion Picture*, everyone wore rather form-fitting white and gray. Only in *Star Trek II* did the red-uniform tradition begin. For this heinous and unforgivable crime, Gordon should be forced to (a) give me a free lifetime subscription of *Maximum PC* and (b) buy me a GeForce3 when they come out.

—Tao Tan

Lt. Commander Gordon Mah Ung responds: I completely disagree. Under the Organian Peace Treaty, Article 15, subsection 12, it states: "Bad episodes of 'Star Trek' may be excluded from consideration in the canon." The treaty was later amended in 2342 to include "movies, films, animated shows, ice capades, and audio books." If you follow Article 15, you must exclude *Star Trek: The Motion Picture* as canon. William Shatner's *Star Trek V* cannot be Article 15ed because he directed it.



"I think you're confusing development of BeIA as development that will certainly go into BeOS."

It Be Thriving

I was glad to see that you lived up to your promise and published an article about alternative OSes, especially BeOS [March 01]. But just to make some clarifications on your BeOS coverage, the personal edition of BeOS 5 Pro does indeed contain the *CD Burner* app; it does not contain apps that require licensing, such as *Real Player*, built-in MP3 encoding, some codecs, etc.

Also, Be Inc. has not abandoned BeOS, after all. They use it as the development platform for BeIA [an OS for information appliances]. They are making some headway in the IA market with Sony's announcement of the eVilla at the recent CES. Besides, would Teac announce new products running on BeOS (not BeIA, as reported) if it were no longer being developed? Open GL, *Opera 4* (with personal Java), and BONE are coming in the near future to BeOS, possibly resulting in a version 6. BONE performance should be close to that of Linux and FreeBSD. Other than that, good job on the MP3 player roundup.

—Galley

Associate Tech Editor Scott Tarr responds: D'oh! We goofed by failing to acknowledge the *CD Burner* app within BeOS' Personal Edition. That stated, I think you're confusing development of BeIA as development that will certainly go into BeOS. The two operating systems are based on the same code, but aren't the same OS.

As far as apps being developed for BeOS, the future doesn't look promising. For example, we discovered that Steinberg has pretty much finished its killer audio app *Nuendo* for BeOS but won't ship it because the company is unsure of what Be, Inc. is up to in the development of BeOS. This is what we were told last year by a Steinberg rep, and it shows that developers aren't confident of Be's interest in its own operating system. And if developers aren't sure, you can bet a death bell is tolling in the background. Hey, I completely understand your devotion to Be. It's been my exclusive OS in the past. But BeOS is being neglected right now. Additions to BeIA will undoubtedly trickle down to BeOS, but Be isn't aggressively working on its maiden project. In the March article we simply stated: "It's a shame that Be, Inc. stopped major development of the BeOS." And this is a warranted statement.

Pull the Stick Out Slowly

Gentlemen: "Exposing the Flow of Crap", "…tend to flood the marketplace with crap", "Why Digital Cameras Suck", "…but rather their crappy features", "…itty-bitty buttons."

Tell me, gentlemen, are these examples of the extent of your vocabularies, or is it in the vernacular

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Fragging Is the Mother of Invention

This is one of the many things that has happened at our LAN parties. We left with more equipment than we came with, and it all couldn't fit in the trunk of our car, and we had no rope, so… no problem! I pulled out some CAT-5 cable.

—NeghVar from ***www.tangolan.com***

Netscape: Why?

OK, for starters, I do not pretend to like M$ products. While for convenience sake, my work machine is a Win2000 box, I use *StarOffice* almost exclusively instead of M$ *Office*, and even less often do I use *Internet Explorer*. I'm a *Netscape* supporter almost all the way, even when it crashes (which I have a strong feeling is actually due to *IE*). But *Netscape 6* is a tragedy. We won't design for it in our webshop and, in fact, we urge people to *not* download and install it. On my Linux box at home I have *Netscape PR1*, then 2, then 3, all of which ran as well as I'd expect from pre-releases. Then the full version 6 came out. I didn't have a chance to upgrade on the penguin, but I put it on my Win boxes (a 98 and a 2000). What a mistake. Bloated and crash happy. Many pages had formatting problems that weren't present in *Netscape 4.76* nor *IE*. It's well known that *NS6* isn't worth the connection costs to download it.

So I'm completely dumbfounded by the fact that you've included *NS6* on your March 01 Maximum CD. Believe you me, I had always hoped my first e-mail to you guys would be one of immense praise. But, damnit, there's pushing the bleeding edge, then there's sending us mail bombs.

—Chris "T-Snake" Moran

that you feel best suits your readers? In either case, I for one thinks it's sick and what we call in Texas pure "trailer trash" language. By copy of this e-mail message, I am requesting that your Subscription Department immediately terminate my subscription and remove my name from your files.

—Michael Russo

Maximum PC Arbiter of Acceptable Cultural Standards Woolworth Van Husen III replies: Mr Russo, we received today your letter via electronic post and were wholly pained by your attacks on the appropriateness of our turns of phrase. Moreover, we are aggrieved that you have chosen to terminate your subscription to *Maximum PC*. Your name in fact occupies a very revered position in our files, and it is regrettable that a less severe resolution cannot be reached.

Let us assure you, we choose our words with the best intentions, and aim to avoid regional colloquialisms, those of Texas-based temporary housing parks inclusive. But sometimes we err. Indeed, the term "itty-bitty" is a barbarism—an unforgivable barbarism—and it should never have appeared in the pages of our magazine, a journal that strives to uphold the canon of the English language at all times and at all costs. With this, Mr. Russo, we ask you to reconsider your decision to terminate your relationship with *Maximum PC*. Your departure, well, it just makes us feel like poo-poo.

Another MP3 Hack

I just finished reading the March issue "Ultimate MP3 Showdown" and thought I would share my "jerry-rigged quasi-solution" to playing MP3s in my car. I have an old Diamond Rio PMP300 solid-state player and picked up a SoundFeeder SF120 Wireless CD Adapter from a discount department store. It connects to the headphone output of the RIO, and allows me to broadcast my MP3 player on any "dead" FM radio station. In other words, I find a station that isn't receiving a signal from a local station, and tune the SoundFeeder to that station. Fast, easy, and cheap (under $20). Occasionally, it's hard to find a "dead station" but when I do, it works great!

—L. Winter

"Rest assured, I was not amused. Ms. Croft is now dressed in a frumpy housecoat and consigned to the spare parts bin in the far corner of the Lab."

Editor-in-chief Jon Phillips replies: To be honest, many *Maximum PC* staffers have given up on *Netscape* as well. Personally, I have always liked its GUI, but have come to the conclusion that it chokes on code that *IE* can more easily digest. We included the software on the disc because a lot of readers requested it. (And we all know how slow the Netscape FTP servers can run during peak download times) We try to include a wide sampling of products on the Maximum CD and make a special effort to include the high-profile apps that people simply want to evaluate for themselves. *Netscape 6* falls squarely in this category.

Hands Off, Cheeky Bunny

If "Herr Phillips" was so concerned over the

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sexual harassment implications of the model ["Lara Croft Model: Tchotchke or Exhibit A," March 01], then why have a picture of him handling her butt?

—Simon Chung

Herr Phillips replies: Actually, just seconds before the picture was snapped, my fingers were firmly wrapped around the doll's combat boots. But with a quickness the little minx jerked her body and dropped down into the compromising position that was caught on film. Rest assured, I was not amused. Ms. Croft is now dressed in a frumpy housecoat and consigned to the spare parts bin in the far corner of the Lab.

Battle of the Gs

I am baffled by your December 00 review of the Matrox G450 [which received a 5 verdict], especially when the review is compared to Sean Downey's September 99 review of the Matrox G400, which received a 9 verdict and a Kick Ass award. Is the G450 that much less of a 3D card?

—Michael Arria

Technical Editor Will Smith responds: The problem is that the G450 is basically a slightly slower version of the G400 Max. Now, the G400 Max was a great card in September 99 when Sean Downey reviewed it, but other card manufacturers have gotten two, four, and even six times faster in the past 18 months, while Matrox has slowed down a bit. If you're looking for a dual-head card, look for a GeForce2 MX-based card with TwinView. Its 3D performance is much better than that of the Matrox cards, and also provides multi-monitor support.

Wasn't This the Story Behind a Rockwell Song?

Sometimes it feels as though my computer is looking at me, as if it knows of my plans to rip out its innards and end its life. My fear is that it's planning a preemptive strike, or a coup perhaps. My only refuge is in the fact that I know it has neither the power nor the resources to perform such a demanding operation. Yet therein lies my initial problem.

—Anthony Sustic

Senior Editor Heuristic Algorithmic Model responds: I think you are mistaken, Anthony. It is impossible for a machine to know what you are thinking, let alone plan a pre-emptive strike against you. You've been under a lot of stress lately. Perhaps you should rest. I'm sensing that the AE35 hard drive unit has a 75 percent chance of failing within the next 72 hours. I recommend that you replace the unit. I've located a spare unit in the sub-basement next to the furnace. If you retrieve the unit now, your computer will experience no data loss.

"Why do vendors even bother making MP3 home stereo players? I've already got one without the extra $300 expense. All it cost me was $5 at Radioshack."

Anything You Can Do, I Can Do Better

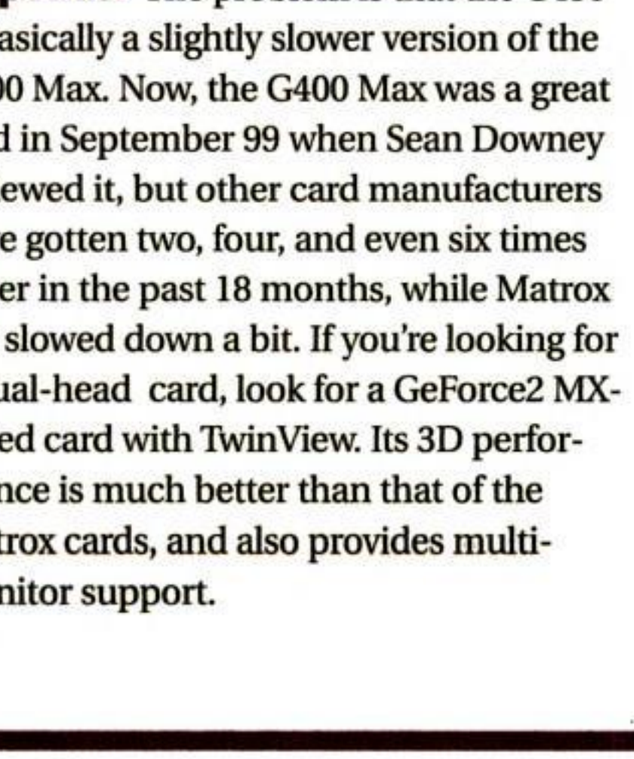
Why do vendors even bother making MP3 home stereo players? I've already got one without the extra $300 expense. All it cost me was $5 at Radioshack. Of course, to get away this cheap, you'll need an existing amplifier/receiver. What I did was use the line-out jack on my SoundBlaster Live card along with a Y-cable with RCA connections (left and right). I plugged the RCAs into the CD input connections on the back of my receiver/amplifier. I use *Winamp* on my computer, and the receiver/amplifier splits the signal across my SurroundSound system, and I have music playing around the house. And why are you better off this way? Well, my system didn't cost that much, and it's cheaper than the $800 AudioRequest [featured in the March 01 MP3 cover story].

—Scott Berg

Technical Editor Will Smith responds: Well, Scott, the problem with using RCA cables is that most people don't have their computers close enough to their stereos. Running RCA cables long distances can cause signal loss and introduce line noise into your tunes. And no one wants line noise, right?

All of the "home stereo" MP3 products we reviewed in our feature were designed to plug into your existing home stereo system. You'll notice that we gave the Dell Digital Audio Receiver high marks because it didn't include an unnecessary hard drive. Instead, the unit elegantly grabs tunes from your computer, using your home network.

By using either a 10baseT or HomePNA interface to connect to your computer, the Audio Receiver can be connected to your home stereo with a shorter RCA cable, and you get the added benefit of being able to control playback—play, pause, change songs, etc.—at no extra cost.



Revealing the Mystery Case

FYI: The case housing the Polywell 850GB (reviewed in your March 01 issue) is from Lian-Li of Taiwan. Not sure why Polywell was cryptic about the case's origin; maybe the company wanted to protect its source. You can find a review of the case at **www.dansdata.com/pc60.htm**. I purchased mine for $189 from the Chicago branch of Leadman Electronics (**www.leadman.com**)

—Jeff "Pepar" Horn

Cut, Copy, Paste

The videocard included with the HP Pavilion 9720 system reviewed in February 01 came with 64MB of memory, not 32MB as originally published.

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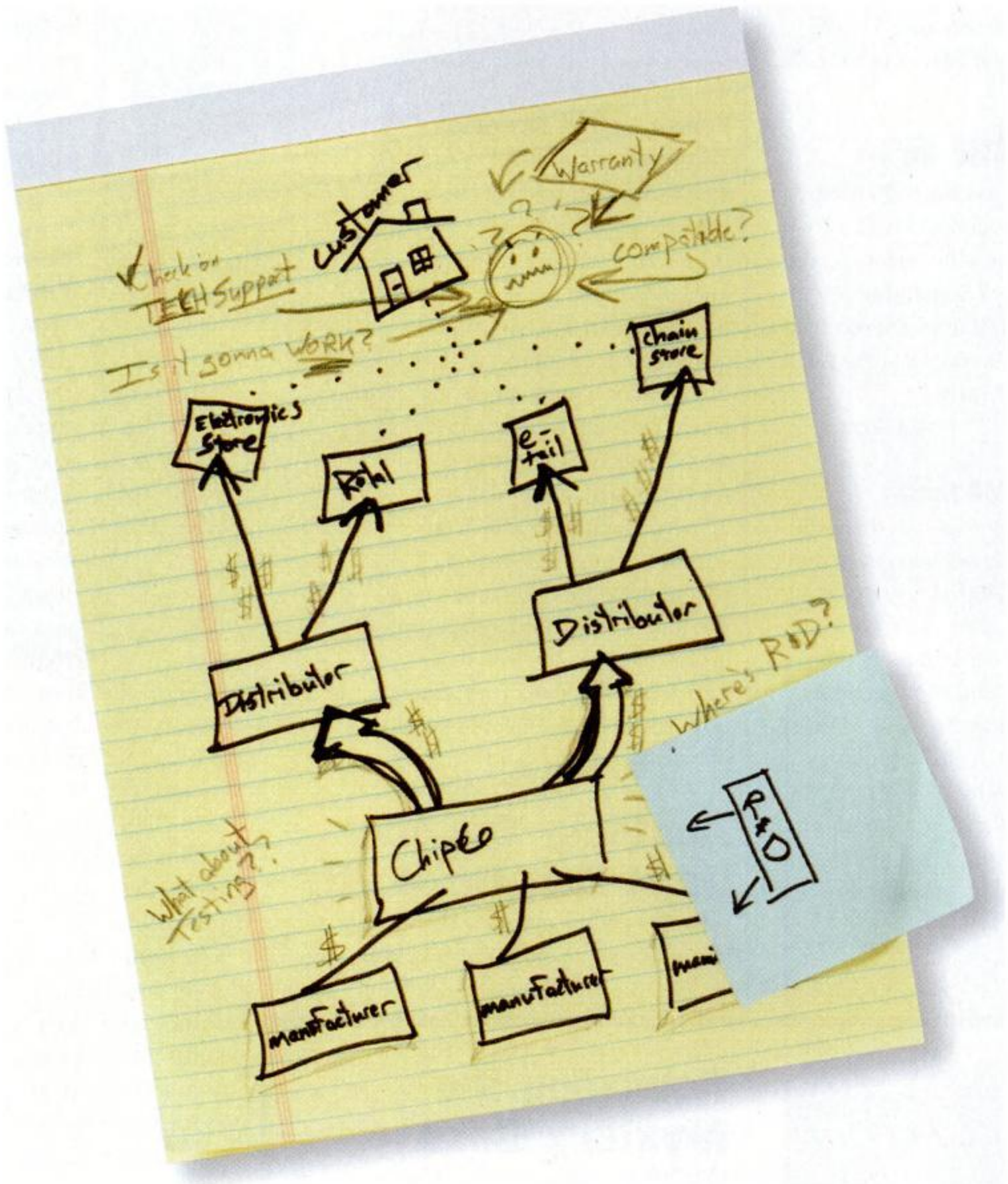
Upgrading your memory doesn't have to be complicated.



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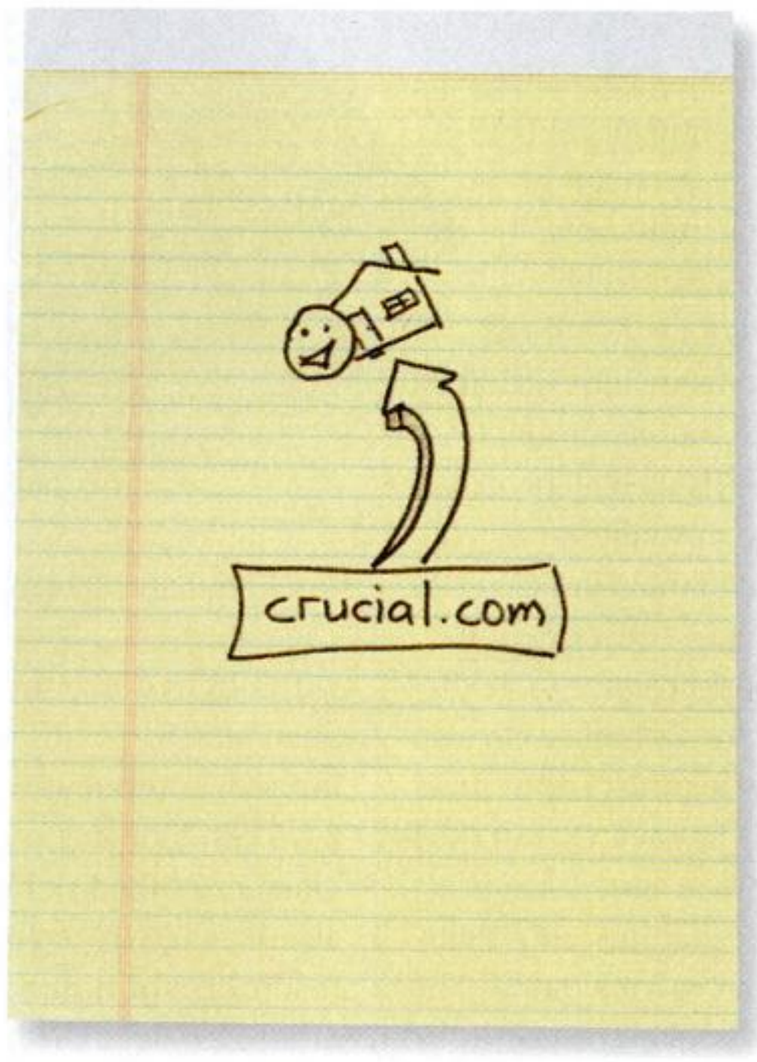

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Notebook 3D War Heats Up

Green nVidia Machine Takes on Mobile Market

If you're still bandaging yourself from the desktop graphics war, hang on to your first-aid kit—the battle has moved from the desktop to the laptop.

The new war pits nVidia against one of the last remaining companies to have withstood its attacks: veteran ATI.

Considering the power of nVidia's GeForce3, it would be easy to assume that nVidia will gain dominance in the mobile market as quickly as it conquered the desktop. But that's not necessarily so, say some industry observers.

If nVidia expects to beat ATI in the mobile game, "nVidia is going to have to put up one hell of a fight," says Jon Peddie of Peddie Associates. Peddie says ATI is at the top of its game right now in terms of high-end and mid-range graphics, with low-end graphics offerings on tap. ATI holds 50 percent of the market. The next most successful graphics company, S3, holds 10 percent.

ATI also has an advantage in the mobile market because notebook makers tend to be much more conservative than their desktop counterparts about changing suppliers.

That's not to say nVidia isn't a fearsome force. During the last two years, nVidia has perfectly executed its roadmap and has collected some of the best engineers available. "nVidia probably has the smartest and toughest design team in the universe right now," Peddie says. But right behind nVidia is ATI, flush with talent from acquisitions.

Faster graphics are headed to a notebook computer near you.

The first mobile product from nVidia is the GeForce2 Go. Essentially a mobile version of the GeForce2MX, the 2 Go is the first chipset to really offer 3D desktop performance in a notebook. But the GeForce2 Go also lacks a few features key to notebooks, Peddie says. One of those is the ability to shut down portions of the graphics chip that aren't in use, to save power. The GeForce2 Go also consumes slightly more power than other graphics chips.

The 2 Go compensates for the power consumption by offloading processing from the CPU, which ultimately saves power. One problem with that logic is that few people use their notebooks for intense graphics or DVD playback—most use them for *Word* and *Excel*. But nVidia argues that no one uses notebooks for intense graphics because they haven't been able to—until now. Indeed, notebooks with the 2 Go can hammer out 50fps in *Quake III Arena* at 1027x768—about twice the speed and resolution of notebooks with older chipsets. Both Dell and Toshiba have begun shipping high-end notebooks with GeForce 2 Go.

ATI isn't standing still. Just after GeForce2 Go notebooks hit the streets, ATI fired back with a mobile version of its Radeon. ATI promises similar or better performance with Mobility Radeon than with the GeForce2 Go, with less power consumption. The Mobility Radeon is highly flexible, with offerings from 8MB of integrated DDR memory to 64MB of DDR or SDRAM. Several OEMs have already selected the Mobility Radeon for their notebooks.

Both chipsets also promise to let you view 3D graphics at the native resolution of notebooks (instead of scaling up 640x480 images) and to treat external monitors as truly separate displays.

Why all this chest-beating over notebooks? In a year of shrinking desktop PC sales, notebooks are the only computers to buck the trend. Even Intel expects notebook sales to outpace desktop sales within a few years.

—Gordon Mah Ung

SPIN CYCLE

This month's top stories broken down ►

HEADLINE	NEWS	DETAILS	THE SPIN	OUR TAKE
New Batteries Promise More Life	Toshiba has developed an advanced lithium battery technology that combines the power of traditional li-ion and the packaging of more expensive lithium polymer cells.	The "ALB" cells can be a single millimeter thick yet offer high capacity and safety, and they won't suffer memory effects.	"The ruggedness and flexibility of the ALB's aluminum laminated film casing makes it one of the most advanced battery solutions currently available," Toshiba says	Thinner, lighter, powerful—and they won't explode!
Napster Is Takin' It to the Streets	Napster is gearing up for a political battle with record labels, and it wants your help.	The company is looking for volunteers to write letters to Washington, form local chapters, and generally piss off the record labels.	"We'll need to act quickly and with unity if our voice is going to be heard—and the Napster Action Network is one way you can influence this fast-moving process."	The spirit is right, but will likely be unsuccessful against the financial influence of the labels.

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DVD Burners Come of Age

New Pioneer Drive Promises to Burn Both CD-Rs and DVD-Rs That Play in Consumer Decks

The days of burning home videos to DVD and playing them on any DVD player are finally here. Trumping the competition, Pioneer has introduced a DVD-R drive that will let you burn up to 4.7GB of data to a disc that will work in 90 percent of the DVD decks on the market, the company says.

Pioneer's DVR-A03 drive will be included in computers from both Compaq and Apple this spring. Compaq will use the drive in its Presario 7000. The IDE-based DVR-A03 will burn DVD-R at 2x, CD-R at 8x, and CD-RW at 4x, and read CD-ROM at 24x and DVD-ROM at 4x.

Until the Compaq/Apple announcement, Pioneer's DVD-R drive had been a dark horse in the race to provide users a mass-market DVD burning solution. DVD-R had been relegated to professionals because the first drives cost several thousand dollars. The DVR-A03 will launch at $1,000, but the price will come down as manufacturing increases, says Pioneer's Andy Parsons. If you're balking at the price, remember: The first CD-R drives cost about the same. Compaq says it will ship $1,700 PCs with the drive.

Pioneer's drives cannot do bit-for-bit copies of DVD movies.

DVD-R is a write-once format that's incompatible with the existing DVD-RAM drives. DVD-RAM discs can be erased and rewritten but come in protective cartridges, limiting the technology to data backup tasks because cross-compatibility with other drives is virtually nonexistent.

Sony, Philips, and HP stand behind a third format called DVD+RW, but have yet to deliver working products. With the arrival of DVD-R, DVD+RW companies are again promising drives by this summer, and they claim consumers will opt for +RW over DVD-R because +RW can be erased.

Though DVD-R discs can only be written to once, Parsons says this shouldn't hurt acceptance. Indeed, consumers currently use far more CD-R discs than CD-RW discs. With the cost of a DVD-R disc starting at $10, Parsons says people will eventually consider DVD-R discs as disposable as CD-R discs.

—Gordon Mah Ung

The X-planation Finally Revealed

Once again demonstrating a predilection for the letter X, Microsoft will call the next version of Windows "XP" instead of "Windows 2001." Microsoft will also call its next office suite "Office XP." The company says the XP stands for "experience."

This isn't the software giant's first brush with the X moniker. Its highly anticipated PlayStation2 killer is dubbed the Xbox. Before that, Microsoft named its collection of multimedia APIs "DirectX." The name "ActiveX" was used for a set of web-based APIs.

Just what is this fascination with X?

Alex St. John, CEO of WildTangent and a co-creator of DirectX, says Microsoft began using X to refer to the entire set of multimedia APIs: Direct3D, DirectDraw… you get the picture. Other API potentates at Microsoft grooved on the convention, and latched onto X as well. And Xbox likely gets its name from being based on DirectX gaming.

St. John says he doesn't know why Microsoft chose XP, however.

Jeff Tarter, editor of the business newsletter SoftLetter, says Microsoft could be trying to play off of the "mystery and coolness" of the letter, as well as attempting to associate the OS with the increasingly popular XML web language. Tarter says the change was important because Microsoft had to divest itself from using years in its product names. "Unlike the car companies, Microsoft can't seem to ship its products in the same year."

—Gordon Mah Ung

to the pertinent details.

HEADLINE	NEWS	DETAILS	THE SPIN	OUR TAKE
AMD Gets Hyper	More than 100 companies are exploring the use of AMD's HyperTransport technology.	Formerly called LDT, HyperTransport's 6.4GB/sec connection can be used to tie CPUs or routers together or as the main communications link between chips.	"HyperTransport is the latest of several technologies AMD has driven to market that deliver tangible performance increases ..."	HyperTransport is a good sign that AMD may finally get into the lucrative server market.
OS Anti-Piracy Gets Tough	Microsoft says it plans to implement anti-piracy in Windows XP that requires people to obtain activation codes from the company.	The company says the process is anonymous but will stop people from installing one copy of the OS on multiple machines.	"Consumers sometimes unwittingly violate their license agreements by sharing software with others," Microsoft says.	End-users aren't the problem—Microsoft should go after organized crime.

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trends ► PC industry

Juno Enlists Customers' Help

Company May Force Customers to Crunch Data in Exchange for Free Internet Access

Want free Internet service? Then hand over some CPU cycles, bub. That's the message from free ISP Juno, which announced in early February that it's developing a for-profit distributed computing project that aims for a combined processor speed of one petahertz—that's a billion megahertz, in case you're keeping score.

Juno says it may soon require more than 3 million Juno freeloaders to lend their PCs to the effort.

The change in Juno's policy transpired as free ISPs in the U.S. scrambled to shore up losses from a continued downturn in online advertising. With a virtual supercomputer running on millions of PCs, says spokesman Gary Baker, the company can get top dollar from companies that need massive power to crunch data.

"We're just starting to talk to companies, and they're mostly in the areas of pharmaceuticals," he says. "The need is very clearly there. Pharmaceutical companies are fairly strong users of supercomputing power."

Juno's virtual supercomputer would follow the model of the pioneering distributed-computing project SETI@home. Currently the largest supercomputer in the world, the SETI@home project uses the computer power of millions of volunteers who download the free SETI@home screensaver application. Like SETI@home, Juno would distribute raw data to its customers' PCs and retrieve the processed data once completed.

Juno has a staff of 300 already developing and maintaining a network of servers that deliver advertising to its free customers. Engineers began developing a way to send data for processing (instead of ads) in late 2000.

David Anderson, the main architect behind SETI@home, says switching from serving ads to distributed computing may be more of a challenge than Juno says it is. According to Anderson, SETI@home is uniquely suited to distributed computing because the project's complex computations can be easily divided into smaller chunks.

"Where Juno may run into problems is that the computational tasks that people will be willing to pay for may have people's modems tied up for a long time. I have some doubts, and I don't know how the users feel about it," Anderson says.

Anderson also sees security as a problem. SETI@home has battled users attempting to hijack raw data or fake processed data. And any distributed-computing project must protect participants against hackers trying to spread viruses.

A new Juno client uses your CPU to crunch data.

Baker says that Juno would ensure security by offering client companies several levels of data encryption, as well as other "tools" to ensure that users can't corrupt data processing. The Juno data is also small enough that even modem users won't notice, he says.

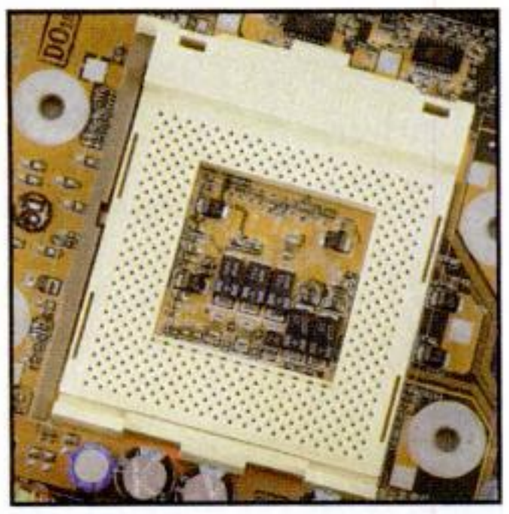
One facet its users may not be happy with is the possibility that Juno may require that computers be left on at all times or crunch a certain amount of units a month. Juno is already testing the project but isn't sure when it would make it mandatory for members.

— Rob Pratt

Is Intel Prepping a Socket Change?

Path to 2GHz May Require a New Motherboard Connector

There's good news and bad news for Pentium 4 lovers. The good news is that Intel may be laying the groundwork for P4 machines that smash the 2GHz barrier. The bad news is that Intel might be forced to leave early adopters behind if it wants to reach for the stars.



Alas, poor 423, we hardly knew ye.

Specifically, the company might phase out the 423-pin motherboard socket that's currently shipping in P4 systems and replace it with a new socket that features 478 pins.

Intel declined to comment on any upcoming changes, but Bert McComas, an analyst with the market-research firm InQuest, says the move is necessary to give the "Northwood" version of the P4 enough power to climb past 2GHz. The current iteration of the P4 is expected to reach as high as 2GHz before being phased out. McComas says that by the time the new P4s arrive, the chips will run so fast, no one will even care about the first generation of P4s, and current motherboard concerns may be rendered moot.

Intel encountered a similar situation with the original 5-volt Pentium chip, which was introduced in a 273-pin Socket 4. Once Intel optimized the CPU, it switched to a 3.3-volt chip and moved to the 320-pin Socket 5 connector. To ease the transition at that time, Intel offered OverDrive versions of the CPU as well as adapters.

Bottom line: Your current Pentium 4 mobo may soon be history.

—Gordon Mah Ung

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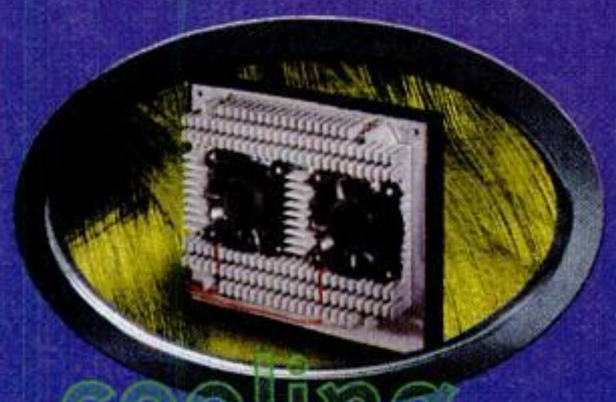

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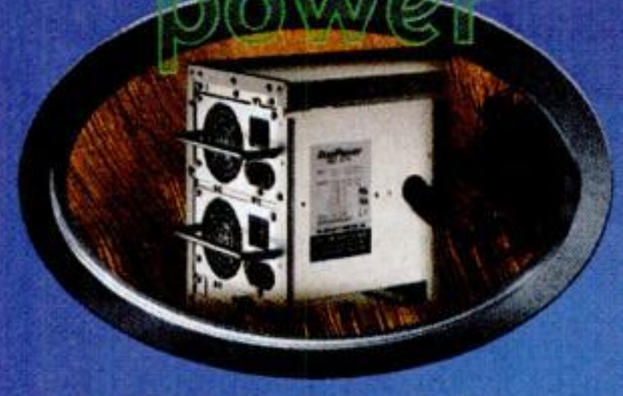

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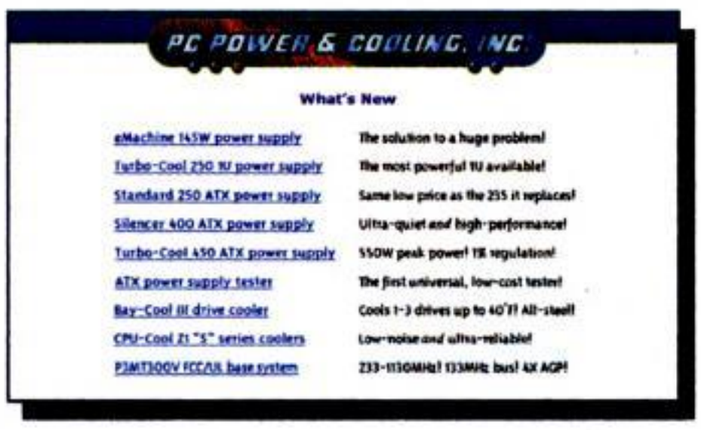
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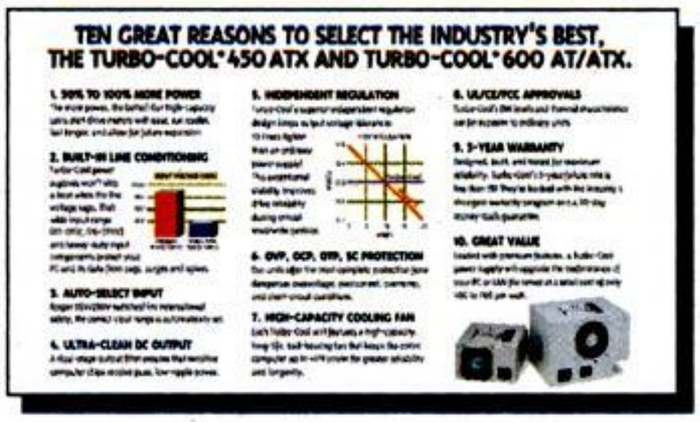
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▶ Maximum PC takes a bite out of bad service and gear

WATCHDOG

Got a bone to pick with a vendor? Been spiked by a fly-by-night operation? Sic The Dog on them by writing **Watchdog @maximumpc.com**. The Dog promises to get to as many letters as possible, but only has four paws to work with.

BROADBAND, MY ASS

What problem do readers consistently bark about? It isn't being ignored by motherboard manufacturers or getting burned by online stores. The number-one complaint continues to be, My broadband provider sucks! Whether it's technical support departments that ignore customers or failing to provide promised hookups, crappy service seems to be the defining characteristic of broadband companies. While The Dog does hear complaints about cable and satellite providers, the majority of complaints stem from DSL service. The Dog asked Justin Beech, editor of the consumer site DSLreports.com, for advice on how to avoid getting burned by broadband providers. Among Beech's top tips:

"Ask for the tech support number and call it at 8 a.m. on a Sunday morning and 1 p.m. on a Monday afternoon."

▶ Never pay an ISP in advance for DSL service, even if discounts are offered. Be cautious about paying a deposit for broadband service. Many orders do not lead to complete service and your deposit may not be refunded. Check whether the price is all-inclusive and covers charges such as the Universal Service Fund (USF) tax. Read the contract carefully.

▶ Ask for the tech support number and call it at 8 a.m. on a Sunday morning and 1 p.m. on a Monday afternoon. In the former case, someone should answer the phone. In the latter case, hold times should not be extraordinary.

▶ Verify exactly where the ISP's point of presence is for customers in your town. Be concerned if this information is not clear or available.

▶ Check to see what kind of dial-up access is available from the provider in case of an outage, or how much dial-up costs if the service is not automatically included.

▶ Check whether the ISP is listed at **www.dslreports.com/gbu** and read the customer reviews.

▶ Investigate whether two-way cable is available in your area; note its price and whether wireless Internet such as Sprint's Broadband Direct is available. Compare this to your DSL options.

▶ Be realistic about your new connection. Do not expect your new broadband connection to vastly improve free streaming videos. Most sites with Windows Media Player and Real streams are overloaded and aren't able to deliver enough streams at high speed to meet demand. Remember, the Internet has "weather" and it's not always clear.

▶ Finally, compare notes on public forums such as **www.dslreports.com/forum** before concluding it's your ISP's fault.

Axis Terra PC is missing in action

AXIS AXED

Dear Dog: I've been a reader of the magazine for a short time and always thought "It would never happen to me!" whenever I read the Watchdog column. Now it has. I originally purchased an Axis Terra computer for my brother. After receiving it, we had to send it back in for service. The company received [the computer] and a tech called back and said it looked like faulty memory. He said Axis would ship the system back shortly. After a month of waiting, we still haven't heard from them.

—Daniel Herko

The Dog Responds: Unfortunately, Daniel was among the many who fell victim to computer vendor Axis Terra. Reader Mike Eastman had similar problems several months ago. Eastman ordered an Axis PC. When the PC didn't ship, Eastman was told of "production problems" and problems getting memory. "I was always told the person who can access the database isn't in today," Eastman said. Another reader said after waiting a few weeks for his order, he was finally sent an e-mail that said Axis could no longer process his order.

What's up with Axis? Nothing—that's the problem. The company's support web site is down, it is refusing to take orders, and calls to the company have not been returned

The owners of the company, Leo Hsu and Willy Hsu, also refused to return numerous phone calls. A search of federal court databases shows the company hasn't filed for bankruptcy, but the lack of response from Axis looks bad nonetheless. To anyone who purchased a system from Axis and didn't receive it, The Dog recommends contacting your credit card company to dispute the charge. Some credit card companies actually offer extra warranty protection for products purchased with the card; check the fine print to see if

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you have such protection. Look here for future Axis Systems updates.

TOTALED PERIPHERALS

Dear Dog: This letter is regarding the bankruptcy of Alcam, the so-called notebook manufacturer that produced products that might more appropriately be named Alpo than Alcam. Perhaps you haven't heard, but Total Peripherals [Alcam's original owner] has followed Alcam into the grave, presumably to share space with other long-gone, sell-below-cost, make-it-up-on-volume PC vendors such as Bulldog Computer.

—John Caporale

WebGear customers may turn to Raylink for help.

The Dog Responds: Yes, unfortunately, after stepping forward and offering to provide support for owners of "Alpo" notebooks, Total Peripherals itself has been given the final bill. The company abruptly shut down in November amid "financial problems," according to former employees and a local newspaper.

"TPI was supposed to be filing Chapter 7. However, it never did," one former employee told The Dog. "So I don't know if the owners are filing personal bankruptcy or if there is something more nefarious going on."

Another ex-employee told The Dog that "all of the employees are still waiting for their back pay, vacation pay, and expense report pay, which the owner of the company promised at the end of November. Please pass this on to your readers so they don't waste their time trying to contact Total Peripherals for system repairs."

"...The Dog is giving the company a minus-9 Suck Ass Award ..."

AVIATOR WEBGEAR GROUNDED

Dear Dog: I bought a WebGear 2.4GHz wireless kit in Nova Scotia, Canada, just three months ago. I went to use it and realized I only had the ISA parts. I ordered the PCI version from WebGear and when that didn't work, I tried contacting WebGear. After several weeks and many voice-mail messages, I have had no luck. I even left messages for the owners of the company and never heard from them. Are they deep-sixed? It's hard to get any good leads or answers up here in Canada. Can anyone tell me the status of this company? Any help would be appreciated.

—Richard Doane

The Dog Responds: Maximum PC gave WebGear's Aviator Pro product a 9 verdict and a Kick Ass Award in June 1999. Now The Dog is giving the company a minus-9 verdict and a Suck Ass Award for its inability to be straight with its customers.

WebGear sold wireless LAN in retail locations. In June 2000, WebGear sold part of its intellectual property to Simtek Corp. In addition to this property, Simtek also bought the URL for WebGear. The president of Simtek told The Dog there was no relationship between the companies, and he didn't know the status of WebGear other than that the company had relocated from San Jose, CA, to Dublin, CA.

Numerous calls to the Dublin office of WebGear have not been returned. WebGear may not be talking about support for the Aviator Pro line, but there's still a glimmer of hope. The 802.11 Aviator Pro series is based on Raytheon's Raylink product. Raylink continues to offer updated drivers and parts, which should be fully compatible with Aviator Pro. WebGear's Aviator products other than the Pro series may have to be upgraded to work with Raylink's newer access points, but the cost of resurrecting the networking gear may be worth it. Please note that Raylink is not offering warranty support for WebGear products, as it didn't actually sell them. For more information, visit **www.raylink.com** or call 800.457.6811.

3DFX OFFERS SUPPORT, SORT OF

There's good news and bad news. The good news is that defunct 3dfx has agreed to offer hardware and technical support for its products until early next year. The bad news is that the company has not made a decision about whether it will offer further drivers for the cards. Without current and updated drivers, a graphics card is pretty much toast. Former employees of 3dfx released a beta driver at **www.x3dfx.com**, and x3dfx says the release will be its last.

Again, The Dog strongly recommends that you avoid 3dfx products, unless you're fully aware that you're buying a product that may have a very short life.

PALM, HANDSPRING MEMORY PROBLEM

Is your Palm forgetting things? Palm Computing has issued an advisory that says a small percentage of its popular Palms may have been shipped with faulty memory. Only 8MB versions of the IIIxe, IIIc, and Vx are effected. The units were manufactured between October 1999 and May 2000. While you might not think your Palm is affected, the problem may only manifest when the unit is almost full. To check out your Palm, get the serial number of the unit and visit **www.palm.com/support/dram**. If your Palm is affected, Palm recommends installing a patch that will prevent your Palm from crashing. The defective memory module also affects an undisclosed number of Handspring Visor Deluxe units manufactured between January and June 2000. For information on how to check your Handspring, visit **www.handspring.com/support/ts_errors.jhtml**.

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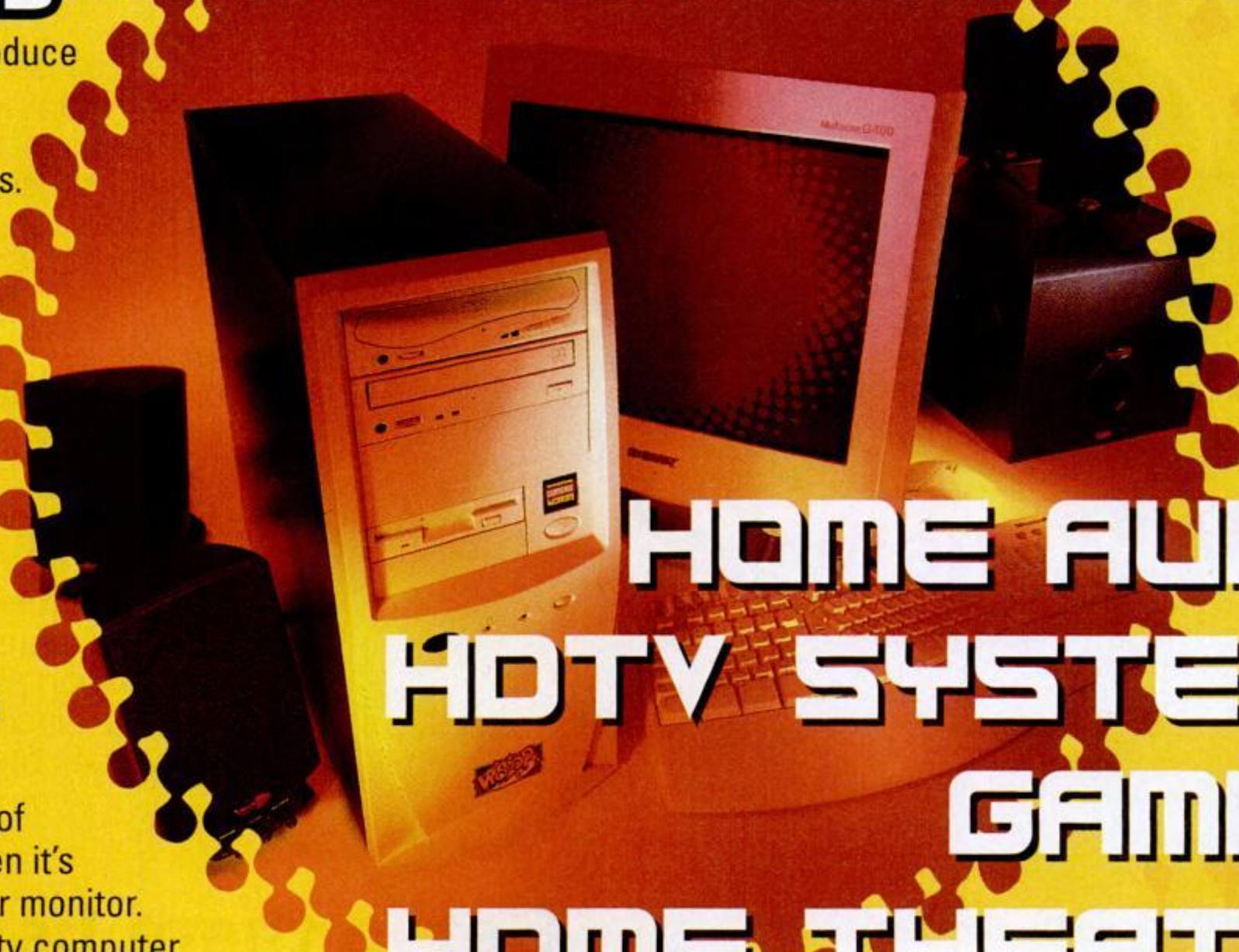

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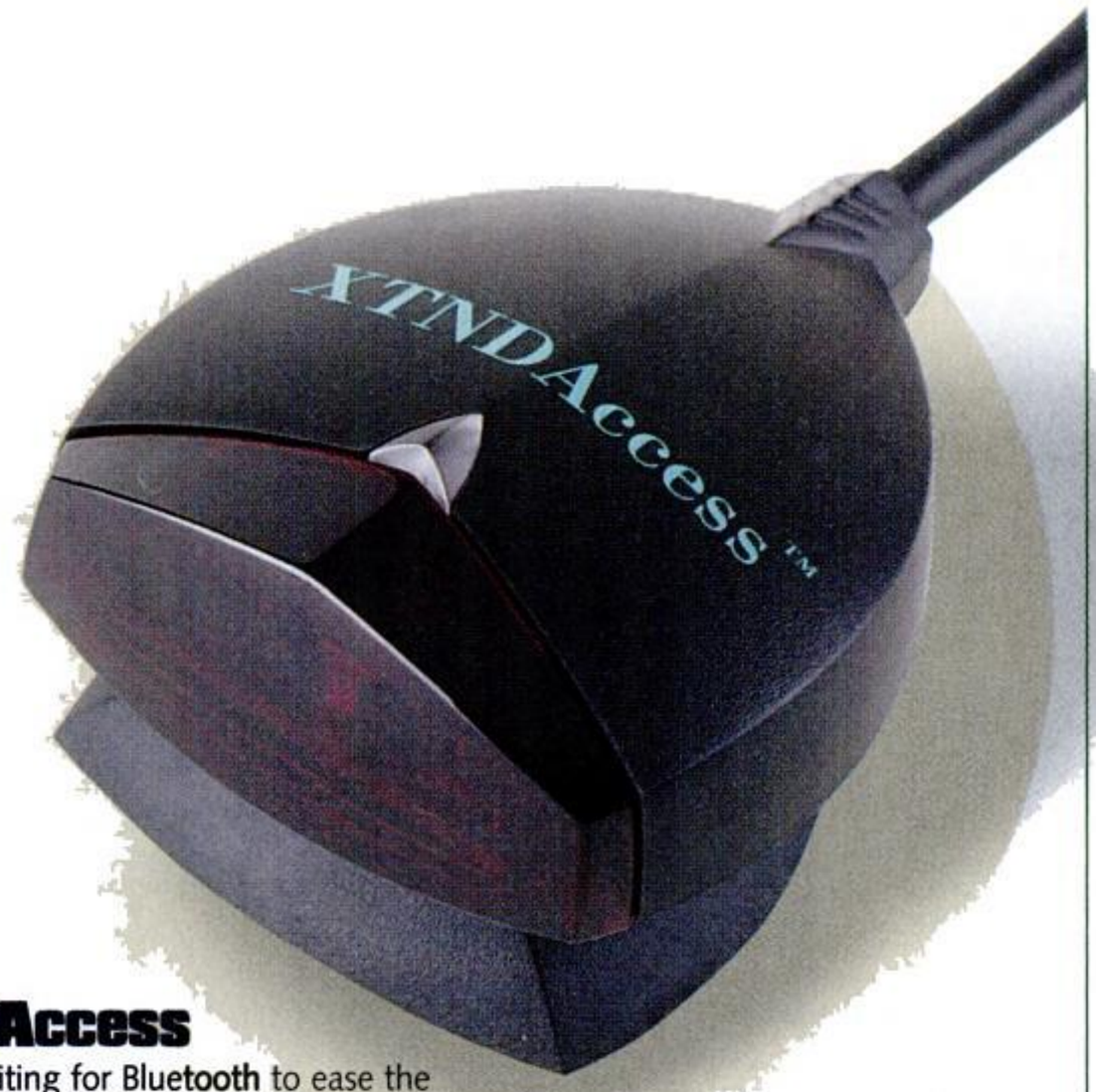

XTNDAccess

Tired of waiting for Bluetooth to ease the synchin' woes between our cell phones and PDAs, some of us have turned to infrared instead. Sure, IR only works in line of sight, and it doesn't work from beyond a one-foot distance, but unlike Bluetooth, it actually exists, and it does let your PC talk to just about any gadget with an IR port. Using the XTNDAccess USB, we were able to dump our address book from *Outlook* into a Nokia 8290 GSM cell phone, sync our Palms wirelessly, and read our co-workers' feeble little minds... no wait, scratch that last one. Windows 98 and 2000 are currently supported, and Windows ME support should be forthcoming.

$90 | Extended Systems | www.extendedsystems.com | 800.235.7576

Q Drive

Tired of flipping floppy disks into your bag just to tote a 32KB Word document back and forth to work? Don't want to bother e-mailing stuff to yourself in order to get it from place to place? Wouldn't you like to have a few files with you everywhere you go—like your *Quake III* configuration file? The Q Drive from Agaté Technologies sports between 16MB and 64MB of memory in a keyfob-sized USB device. It's literally small enough to carry everywhere, but big enough to hold most any files you might need. The only downside to the Q Drive is that it currently supports only Windows 9x and Millennium, although we've been assured that you can expect to see Windows 2000 drivers shortly.

$130 | Agaté Technologies | www.usbmedia.com | 800.982.4283

DSP-500 Headphones

While we don't necessarily dig the "cool design" of Plantronics' DSP-500 USB headphones (around here, they're affectionately known as "the dorkphones"), we can't argue with the sound they produce, or the fact that the nifty, unidirectional boom microphone doesn't pick up extraneous noises. We've slammed USB speakers in the past for sucking spare cycles from your CPU, but the Plantronics DSP-500 includes a DSP to give the CPU a rest. While we wouldn't recommend the DSP-500 for gaming, when it comes to voice recognition and teleconferencing, Features Editor Kristen Salvatore says, "They're great. I laughed, I cried—the DSP-500s are better than *Cats*."

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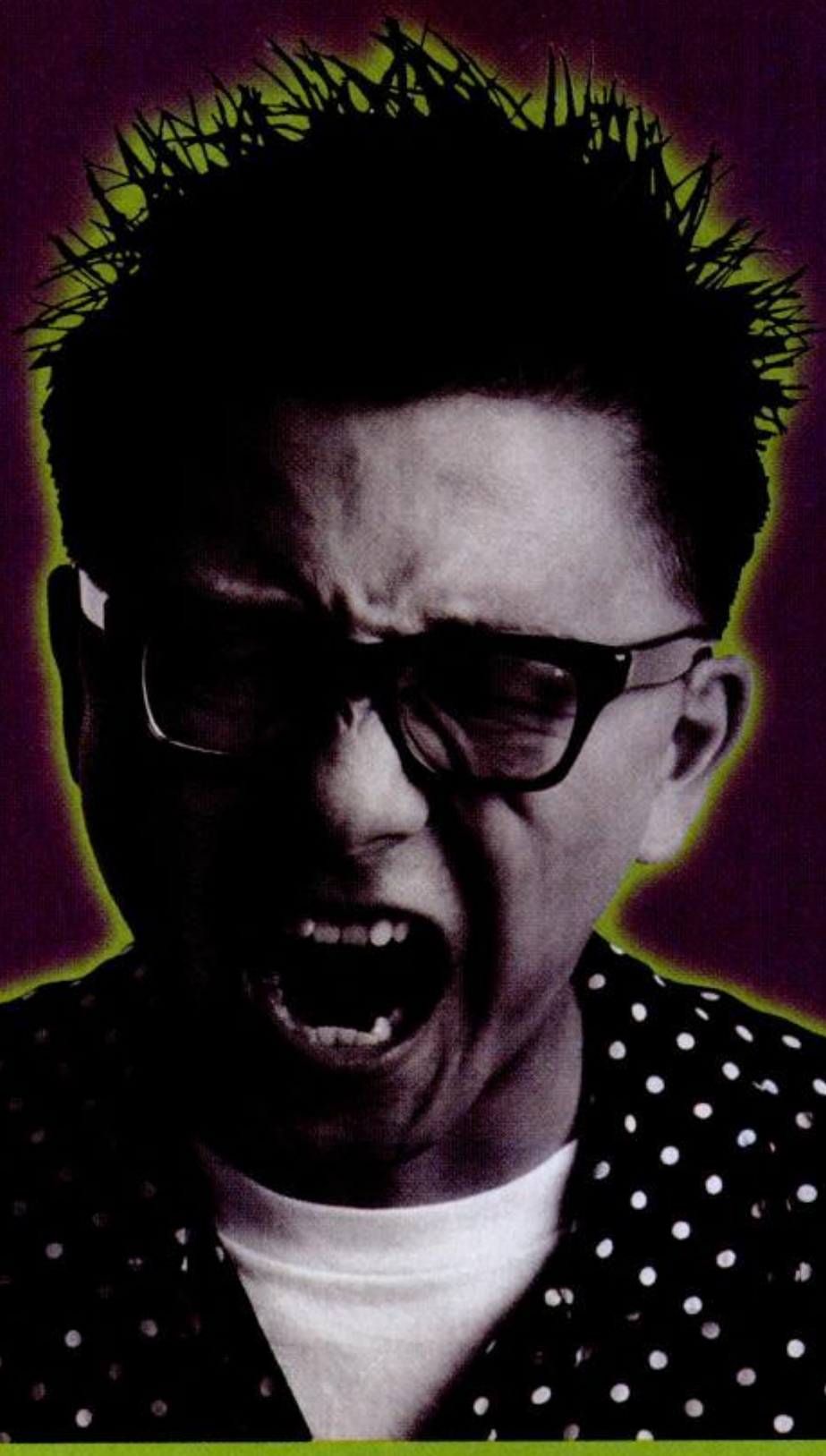

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▶ TOMORROW'S TECHNOLOGIES EXPLAINED

FAST FORWARD

Coping with a Disappearing ISP

WHAT TO DO WHEN YOUR INTERNET SERVICE PROVIDER GOES OFFLINE

Whiplashed stock-market investors and laid-off tech workers aren't the only victims of the dot-com collapse. As numerous ISPs go out of business, millions of users suddenly find themselves stranded on virtual desert islands without e-mail or web access. I became one of those castaways, and I've got some advice that might help you survive.

The first thing to realize is that anybody's ISP can disappear at any time, with little or no warning. Even broadband users can see their fat pipes dry up overnight. Over the past six months, DSL providers have been falling faster than bad guys in a Nintendo game. The problem isn't demand—one well-known DSL provider installed more lines in the last quarter of 2000 than it did in the previous four years put together, then was forced to axe 800 jobs after four ISP partners filed for bankruptcy.

What's going on? Smaller ISPs are succumbing to bigger ISPs, and DSL providers are bleeding money from the high cost of setting up new customers. My DSL provider had to eat the cost of two visits by technicians to get the line working.

When my dial-up ISP ran into trouble, I had no warning. One day the mail server simply stopped responding. A few days later my personal web site (hosted on the ISP's servers) went down. Then the ISP's own web site went down. Phone calls to tech support were answered by a lame recording about a "network outage." I called corporate headquarters; a woman denied that the company was going out of business. Shortly afterward, it filed for bankruptcy.

Losing your ISP is a major hassle. First, you have to find another ISP that offers similar services at an acceptable price—research that's more difficult when you can't get online. Then you have to notify all your friends and business contacts that you've got a new e-mail address—and hope they update their address books. If you've registered at any web sites under your old address, you've got to register again—if you can remember them all. If you've ordered anything online that hasn't arrived yet, the merchants can't reach you with notifications about shipping delays. If you've entered any online contests that haven't concluded, you might not learn if you've won. If you belong to eBay, changing your address automatically displays the cautionary sunglasses icon next to your user name for 30 days, which might erode the confidence of buyers and sellers. If you had a web site hosted by your ISP, Internet search engines will no longer point to a valid URL and surfers will get the annoying "Error 404: Page Not Found" screen.

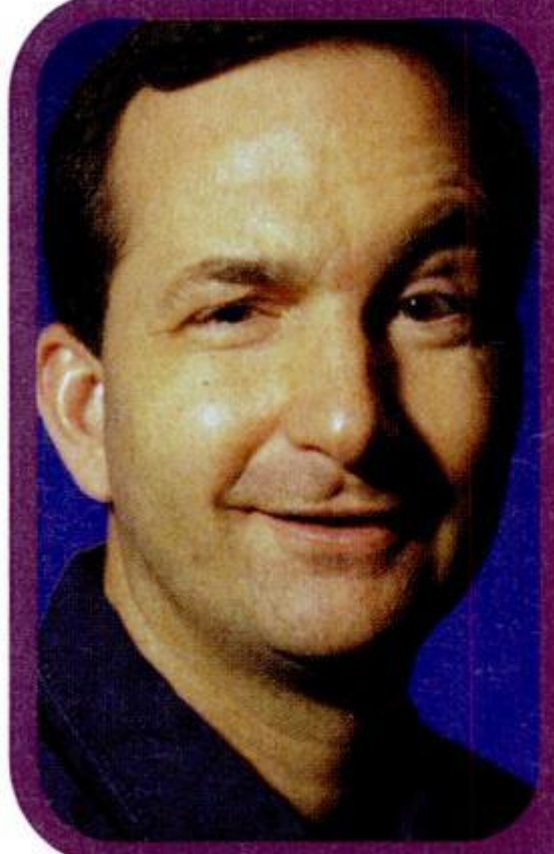
Over the past six months, DSL providers have been falling faster than bad guys in a Nintendo game.

That's why I've switched to a virtual e-mail address—a dummy address that points to a real address. It's like having a post-office box for snail mail. I adopted tom@halfhill.com as my virtual address because I had already registered the Internet domain halfhill.com. My new address is virtual because there isn't really a mailbox for tom@halfhill.com. Instead, my domain is hosted by a service that lets me forward mail to any address I want. For now, tom@halfhill.com points to halfhil2@postoffice.pacbell.net, a mailbox supplied by Pacific Bell, my DSL provider. My virtual address is easier to remember and more permanent. If my new ISP goes out of business or if I change ISPs, I can continue using tom@halfhill.com simply by redirecting it to a different mailbox.

This solution works great if you own an Internet domain. Even if you don't, you can still get a virtual address. There are many places on the web that offer free or low-cost virtual addresses at preregistered domains. Some virtual mailboxes are web-based, while others allow POP3 access.

You can also get virtual web hosting. The virtual URL for my personal web site is **www.halfhill.com**, which currently redirects traffic to **home.pacbell.net/halfhill**, the real URL. Virtual hosting lets me relocate my site without changing the URL on my business cards and correspondence. However, it still doesn't solve the problem for search engines, because they index web sites by real URLs, not virtual URLs. Only true domain hosting can fix that.

As the ISP industry consolidates, more people will find themselves with defunct ISPs, obsolete e-mail addresses, and dead-end web-site URLs. Establishing a virtual address now could save you some grief later on. ✹



TOM HALFHILL
was senior editor at *Byte* magazine and is regarded as one of the most knowledgeable experts on processor technology in the industry. Contact him at **thalfhill@maximumpc.com**.

Random Thoughts

▶ Free virtual mailboxes are available from Yahoo, MSN (Hotmail), and a zillion other places. Check out **www.emailaddresses.com**, a directory of more than 1,100 free and low-cost e-mail services.

▶ To get a distinctive e-mail address, go to **www.iname.com**. They've got domains like techie.com, lawyer.com, engineer.com, artlover.com, seductive.com, usa.com, and many others. Web-based mailboxes are free; POP3 mailboxes cost $40 a year.

▶ For easy domain registration, virtual mailboxes, and virtual web hosting, try **www.yournamefree.com**. Sometimes they offer discounts on domain-registration fees, too.

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▶ THE SCOOP FROM A MAJOR PLAYER

GAME THEORY

Seven Titles to Watch

UPCOMING PC GAMES MAY END YEAR-LONG INDUSTRY SLUMP

PC gamers can be forgiven for feeling ignored this past year. The bottom certainly dropped out of the barrel, as lagging PC game sales and some notably expensive flops drove the major development houses to consoles in search of their filthy lucre. That strategy didn't quite work either: PS2 never got it up and Sega pulled out entirely. This is all very odd, since the game market continues to be strong. Console gamers—particularly Dreamcast fans—were treated to one brilliant title after another. Sega alone created a design renaissance rarely equaled in the annals of electronic gaming.

Meanwhile, there was a notable longueur for us PC folks. Sure, there were reasons to be happy: *Sacrifice*, *Giants*, *No One Lives Forever*, *Baldur's Gate II*, and, well, that's about it. That may change over the next year, with a pretty solid roster of intriguing titles on the horizon. Any or all of these may take a sudden leap into the shallow end of the tank at some point in the development cycle, leaving us with a few good screenshots, a few dashed hopes, and a big hole in our hard drive where a good game should have been. But, for the moment, let's be positive:

▶ ***Tribes 2*:** The development time for this insanely in-demand follow-up to a brilliant game (which many didn't even bother to play) has gone on longer than a Democrat complaining about the election. This means the sequel will likely follow one of two models: either the *Starcraft* model, in which Blizzard took its time and crafted a brilliant game, or the *Diablo II* model, in which the developers couldn't figure out why anyone would want high-res graphics. Since *Tribes* was fine, hand-crafted goodness from one of the best design teams in the country, we hope for the former. The screen shots, which are released to the web at a rate of about one-per-nanosecond, look fab, and the new multiplayer modes and level editor should make *Tribes 2* the most well-rounded action game on the net. Now, if we can only get people to play this one...

▶ ***Tropico*:** I was disappointed when PopTop's Phil Steinmeyer said he wasn't bringing the 3D Dreamcast version of *Railroad Tycoon II* to PC, where it would be a more natural fit. The developers were too busy working on a new title called *Tropico*, a strategy game wherein users develop a remote Caribbean island. It's basically *SimBananaRepublic*, allowing you to control building, agriculture, trade, and politics like a true tin-pot dictator.

What in the name of sweet holy Hera does Dreamcast have to do with PC gaming?

The concept doesn't leap off the page as anything new, but with PopTop behind it, the execution will be top-notch.

▶ **Unannounced Sim Project:** Sadly, I have to be coy about this one, since it's still under wraps and the developer wants to wait until it's further along before announcing it. However, I can tell you that it's coming from a man behind three terrific games and someone I consider to be one of the best designers in the business. It's going to be a massively multiplayer, persistent world-building game with elements of economics, character, house-building, and more.

▶ ***Empire Earth*:** Rick Goodman's follow-up to *Age of Empires* looks to be an ambitious realtime world-building strategy game spanning time from prehistory to the far future. The specs are daunting, but the early peeks have been promising. The game is graced with over 300 unique units, numerous epochs, and an expansion of the RTS/*Civilization*-hybrid gameplay that made the *AoE* games a hit. Considering that the game has been almost two full years in development, it's rather shocking that we've heard so little about it. The backlash against *Age of Empires* in some quarters may have instilled some caution.

T. LIAM MCDONALD
is a veteran gamer and game writer. His reviews appear regularly in *PC Gamer* and other publications. Write him at **tmcdonald@maximumpc.com**.

▶ ***Star Trek: Away Team*:** Everyone who sees *Away Team* says the same thing: *X-COM* in the Trek world. Considering the huge popularity of *X-COM*, the fact that turn-based squad-level strat games have been largely MIA (with the exception of *Jagged Alliance*) is puzzling. *Away Team* should rectify this, offering a covert operations team to take on the jobs the Federation can't officially touch. This one could go either way, given the history of the *Trek* gaming franchise, but if it works, it would be sweet.

▶ ***Independence War II: The Edge of Chaos*:** A follow-up to one of the kings of space combat, *I-War 2* comes from Particle Systems with a brand-spanking-new graphics engine, more customizable ships, and more of the same combat action that distinguished the original. With *Freelancer* on the ropes (yeah, yeah, I know it hasn't been cancelled, but...), this will be the space combat game to watch.

▶ **Dreamcast:** What? What in the name of sweet holy Hera does Dreamcast have to do with PC gaming? Well, since it pulled the plug on its console hardware production, Sega has gone what is cloyingly called "platform agnostic." This means that one of the greatest game makers in history will be bringing its games to all platforms. The PC can only be enriched by the likes of *Crazy Taxi*, *Jet Grind Radio*, and *Shenmue*. Watch for some Sega-PC titles in the next year.

There are even more titles you need to watch for: *Majestic*, *Shogun: Total War Warlord Edition*, *X-COM Enforcer*, *Serious Sam*, *Steel Soldiers*, *Real War*, *Europa Universalis*, *Battle Isle: Darkspace*, *Legends of Might and Magic*, and *Freedom Force*. None of these are guaranteed to be more than mere coasters, but I'm being optimistic and hoping for a better year in 2001 than we had in 2000. We deserve it.

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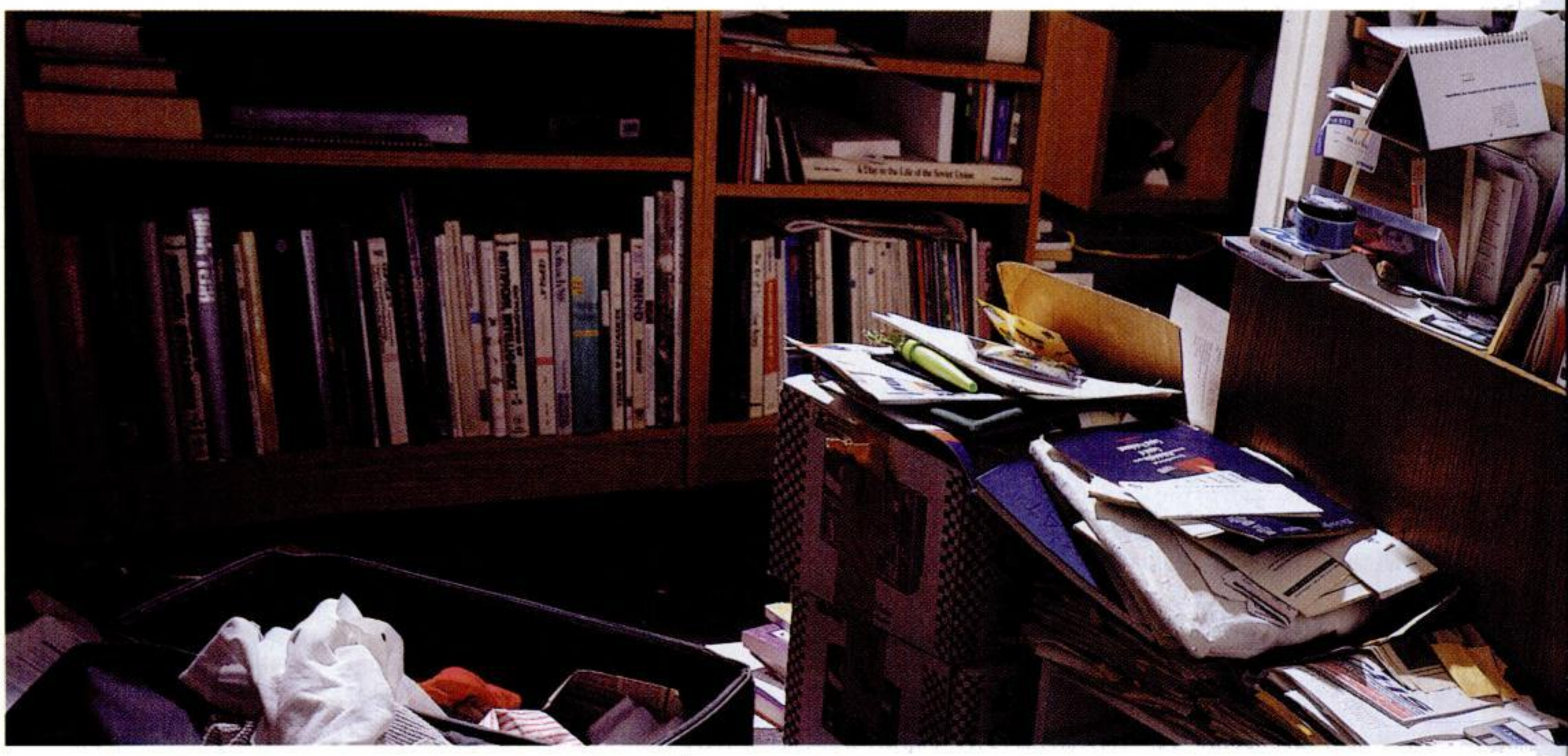

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GeForce

We've seen it. We've benched it. And now we give you the scoop on nVidia's next-generation chip, a graphics processor that completely reinvents visuals in 3D games.

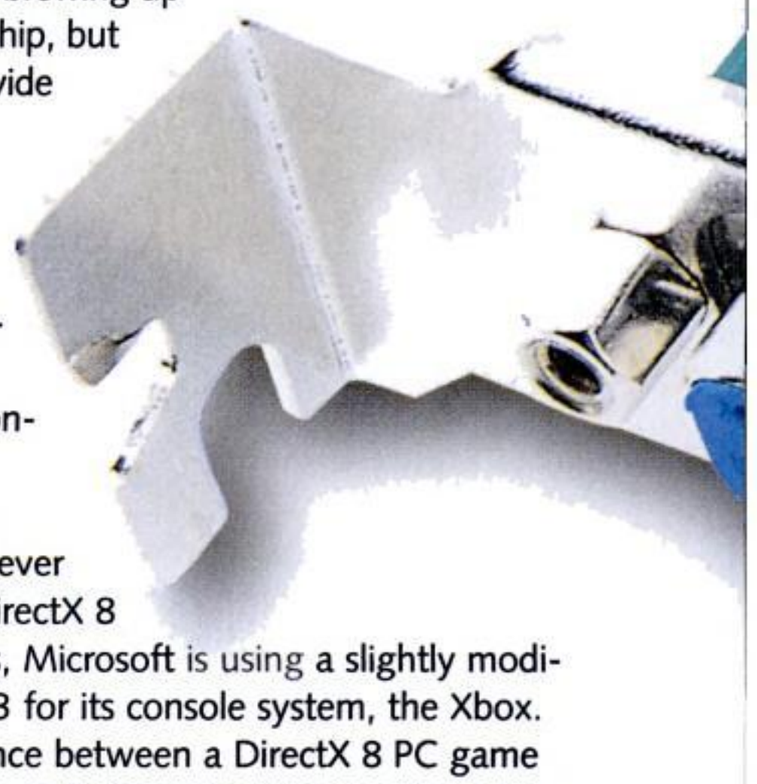
by Will Smith

You've owned them all—the original Voodoo Graphics, the mighty Voodoo2, and the TNT. The Savage 3D, TNT2, and Rage 128. The G400 Max, GeForce, and Radeon. You're a certified 3D-gaming whore, and you think you've seen everything that a 3D accelerator can do. But what you've seen is just the beginning. Prepare yourself for the GeForce3, a true revolution in 3D graphics.

Hardware vendors have released dozens of 3D accelerators over the past five years. Each successive generation has run faster and has included more features, but the core technology hasn't changed since the Voodoo chipset began charming gamers back in the mid-1990s.

The 3D accelerators with which we're all familiar are very specialized chunks of silicon. They're capable of delivering ridiculously high frame rates, but that speed comes at the expense of flexibility. More precisely, current favorites such as the Voodoo5 and GeForce2 can only draw a 3D scene if the scene is described to them in a particular way. So, in order for game developers to take advantage of these accelerators, their games must be able to output data that describes 3D environments in a way that the accelerator can digest. To do this, developers use programming interfaces—that is, APIs such as Direct3D or OpenGL—that both the accelerator and game understand.

But the rules have changed with the advent of DirectX 8. For the first time since 1995, a new type of 3D accelerator has emerged. The first fully programmable video chipset has arrived: nVidia's GeForce3. What does "fully programmable" mean? It means that instead of writing games to conform to a specific, rigidly defined 3D pipeline, software developers can now bend the 3D accelerator to their will and define their own 3D pipelines. This involves writing extra code that tells the GeForce3 how to handle the idiosyncrasies of the customized pipeline. Sound familiar? Indeed. Much like a full-fledged CPU, the GeForce3 can process a wide range of code. This chipset from nVidia is the first of the new programmable accelerators, but others will surely follow. We know that ATI is brewing up a programmable DirectX 8 chip, but company reps wouldn't provide any details at press time.



This all sounds a little too familiar, eh? You heard and believed the hype about hardware transform and lighting but got burned when developers continued to base their system requirements on 3-year-old cards. Who's to say if we'll ever see any games that push DirectX 8 hardware? Well, for starters, Microsoft is using a slightly modified version of the GeForce3 for its console system, the Xbox. This means that the difference between a DirectX 8 PC game and an Xbox game could be as little as an extra week's worth of development effort. Expect to see lots of Xbox games that take full advantage of the GeForce3 found in PCs.

The GeForce3's core technology is rip-roarin' and ready to go. And unless ugly rumors about yield problems materialize, you should be able to run right out and buy a GeForce3-based card today. On the following five pages, we'll tell you how the chipset works its magic, show you what visual effects to expect from games, and give you the lowdown on performance, including the first ever GeForce3 benchmarks.

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3

The Specs

Core speed: 300MHz

Memory speed: 250MHz DDR (500MHz effective)

Process: 0.15 micron, 57 million transistors

Special features: Programmable pixel shader capable of 36 pixel operations per pass; 128 new instructions used in vertex shader.

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GeForce 3

Up Close & Personal

Naturally, the driving force behind GeForce3-based videocards is the chip, formerly code-named NV20. Sporting a whopping 57 million transistors, the NV20 is one of the most complex chunks of silicon ever developed. For comparison's sake, the Pentium 4 has 42 million transistors, while the Pentium III has a paltry 9.5 million.

Clock speed? The reference board that nVidia showed us ran a 300MHz core clock with 250MHz DDR SDRAM. (Caution: These numbers might change; nVidia has made 11th-hour adjustments in the past.) But unlike traditional 3D accelerators, the GeForce3 isn't necessarily defined by its basic operating frequencies; its ultimate performance keys into a different set of factors. Read on and we'll tell you just how dramatically the new chipset breaks from tradition.

Programmability

Programmability is the main feature that separates the GeForce3 from every other 3D accelerator available today. Traditional 3D accelerators are designed to perform specific types of matrix math in a specific order at extremely high speeds. In traditional 3D-rendering pipelines, the CPU (or T&L engine, if the videocard is equipped with one) first describes the shape of the object being rendered, then passes that information further down the pipeline to the 3D accelerator, which describes the surface appearance of the object. This old-school accelerator is designed to accept information in a specific format. If a game developer wants to deviate from that format, the game code must use the CPU to convert the data into something the 3D accelerator can take advantage of. Naturally, this is a confining framework in which to develop games.

The programmable nature of the GeForce3 allows game developers to break away from the constraints of the traditional 3D pipeline. Instead of relying on the CPU (or T&L engine) to prepare data for the 3D accelerator, a developer can now load an entire scene into the GeForce3's programmable shaders, without breaking the scene into thousands of component polygons. After an object is loaded, it's also possible to make further changes to it using programs that can alter everything from the shape of a model to the reflectivity of an object's surface. The two different types of programmable shaders—vertex shaders and pixel shaders—create different types of effects. The shader scheme developed by nVidia has been dubbed the nFiniteFX programmable architecture.

The Vertex Shader

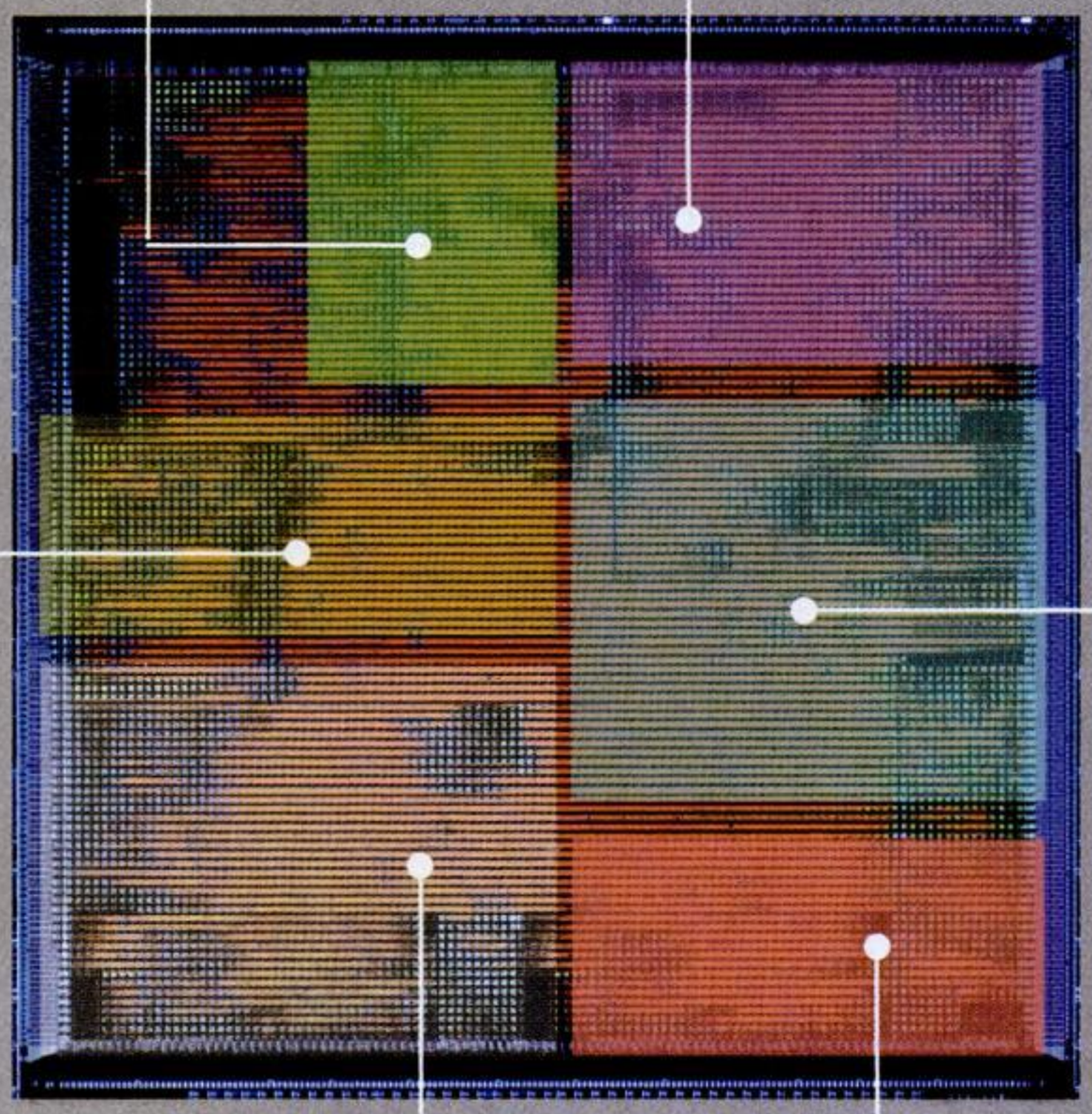
Before we continue, you need to know that every object displayed in a 3D game is made up of triangles—sometimes hundreds, often thousands of triangles. When several of these triangles meet, they form a vertex. In traditional 3D pipelines, either the CPU or a specialized area of the video chip crunches the math necessary to describe and draw the thousands of vertices that comprise each 3D scene. But in the GeForce3, a vertex shader takes care of all of this and then some. Because the vertex shader is programmable, it can be used to pull off tricks with vertices that would bring traditional 3D accelerators to their knees.

Circuit by Circuit

2D
The 2D area of the GeForce3 is responsible for everything you see when you aren't playing a game. 'Nuff said.

Vertex Shader
The vertex shader can control and manipulate the location of every polygon in any given scene. To see vertex effects in action, check the Blobby Dino images on pages 34 and 35.

Pixel Shader
While the vertex shader takes care of the location of the polygons in a scene, the pixel shader is responsible for the polys' appearance.



Anti-aliasing
This section of the GeForce3 chip is optimized for multi-sample anti-aliasing, which is a way to increase the quality of FSAA without as large a performance hit.

Memory Controller and Optimization
This circuitry optimizes the memory performance of the GeForce3 by using four memory controllers to grab information from memory.

Texture Engine
The texture engine caches frequently used textures and handles the lossless compression tasks for the GeForce3.

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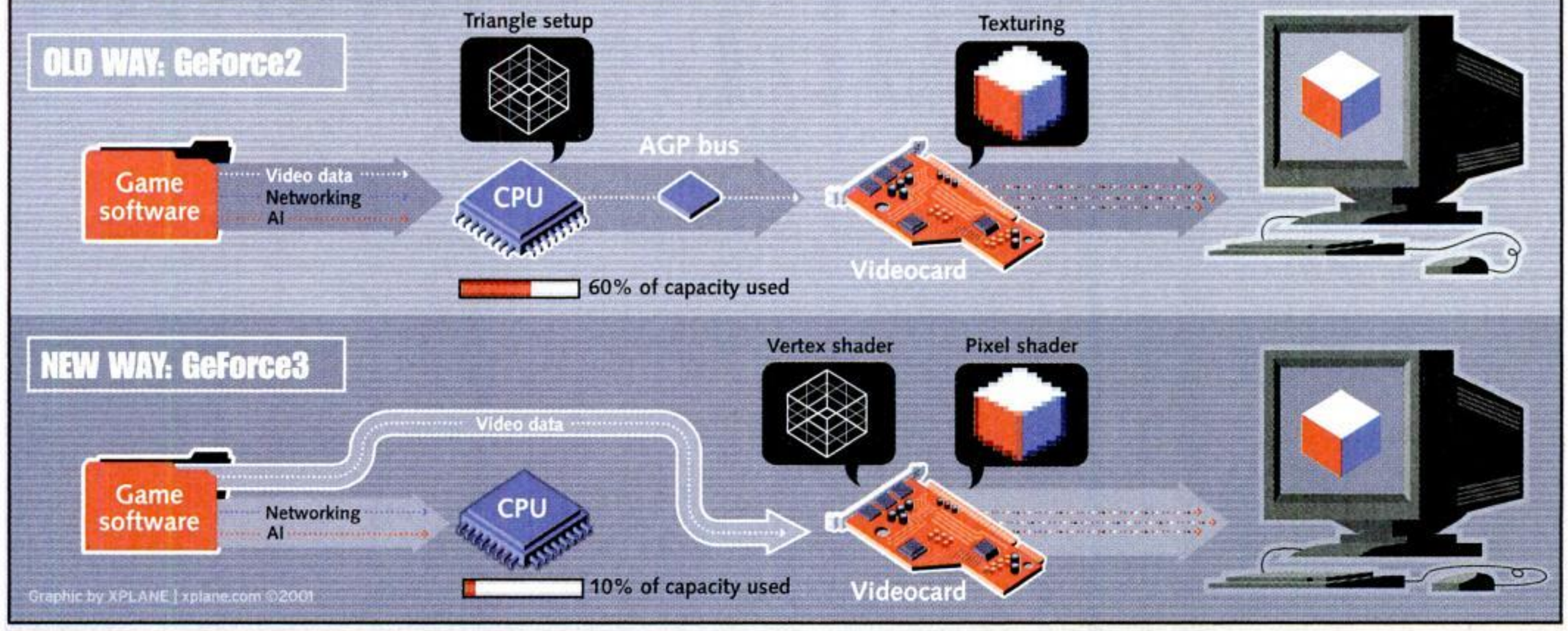
Unloading the CPU's Burden

Prior to the GeForce3, your PC's CPU shouldered much of the 3D acceleration workload. The GeForce3's vertex shaders, however, will handle many of the tasks previously left to the CPU.



With traditional 3D accelerators, each vertex simply represents a three-dimensional point in space. With the GeForce3, the vertex still contains that spatial information, but can also serve as a container for other types of information—for example, what happens to a vertex when a model explodes. Even better, the actual vertex information itself—that is, the information describing the vertex's position in 3D space—can be manipulated much more easily than in previous processes.

The vertex shader can be used to deform, stretch, or shrink any object within a game. Effects such as ripples in water are difficult to implement via a traditional accelerator, but can be done with a few short lines of code with the GeForce3—and all without a huge frame rate hit. Matrix-skinned joints can also be much more efficiently implemented with vertex shaders, creating joints that look more smooth and lifelike.

The Pixel Shader

If you're stoked after reading about all the wacky magic that vertex shaders can do, pixel shaders should make you blow a gasket. After the vertex shader does its thing and creates a scene, it passes that scene on to the pixel shader for texturing and lighting effects to be added. Not surprisingly, the GeForce3 handles these duties in a manner entirely different from previous 3D chipsets.

In a traditional accelerator, a 2D bitmap (a.k.a. a texture) is stretched over a wireframe mesh to give the mesh the appearance that the developer wants. Developers can also use multiple textures on a single wireframe surface to simulate complex visual effects. For example, *Quake III* uses pre-rendered "lightmap" textures to cast shadows on different surfaces. And then there's "environmental mapping," which casts the reflection of an entire panorama on a single reflective surface. Such multi-texturing tricks allow game developers to render amazing visual effects without incurring the massive processing hit that would be required by realtime 3D rendering. So here's the kicker: The GeForce3's pixel shaders can render most of the effects made possible by multi-texturing *without having to use more than one texture*. This translates into faster frame rates and better visuals.

Take bump-mapping. The GeForce3's pixel shaders can add greater texture and depth to models by expanding upon the popular types of bump-mapping, including dot-product and environmental bump-mapping. The pixel shader is also capable of generating "procedural textures" by using an algorithm to create bitmap images on the fly instead of using static bitmaps. Volumetric textures are prime candidates for procedural texture generation. (Volumetric textures are basically memory-intensive 3D textures that are used to illustrate complex visuals such as patchy fog or the rings inside a tree.)

Perhaps the vertex and pixel shaders' most amazing effects are true environment-mapped reflections—moving objects that reflect everything around them. And by using a technique called Blinn Bump reflection, moving objects with bump maps can now reflect their environments.

The Rest of the Best

The GeForce3 also includes a traditional 3D acceleration engine that's considerably faster than that of a GeForce2 Ultra. This speed increase means that the GeForce3 can run most existing games at a very playable frame rate of around 60fps—with Full-Screen Anti-Aliasing enabled.

As ATI's Radeon cards demonstrated, a little optimization goes a long way with memory bandwidth. That's why the GeForce3 sports multiple independent memory controllers, each capable of grabbing data from any spot in memory (the GeForce2 has only a single memory controller). This new scheme allows much more efficient use of the bandwidth between the graphics chip and the on-card memory, and helps to keep the 3D pipeline full, maximizing the bandwidth that's available.

With its own central processor and memory sub-system, the GeForce3 is essentially a highly specialized computer plugged into your AGP slot. It handles all of your 3D graphics work, leaving your computer's CPU to concentrate on anything else that a game developer might throw at it, such as more intense AI.

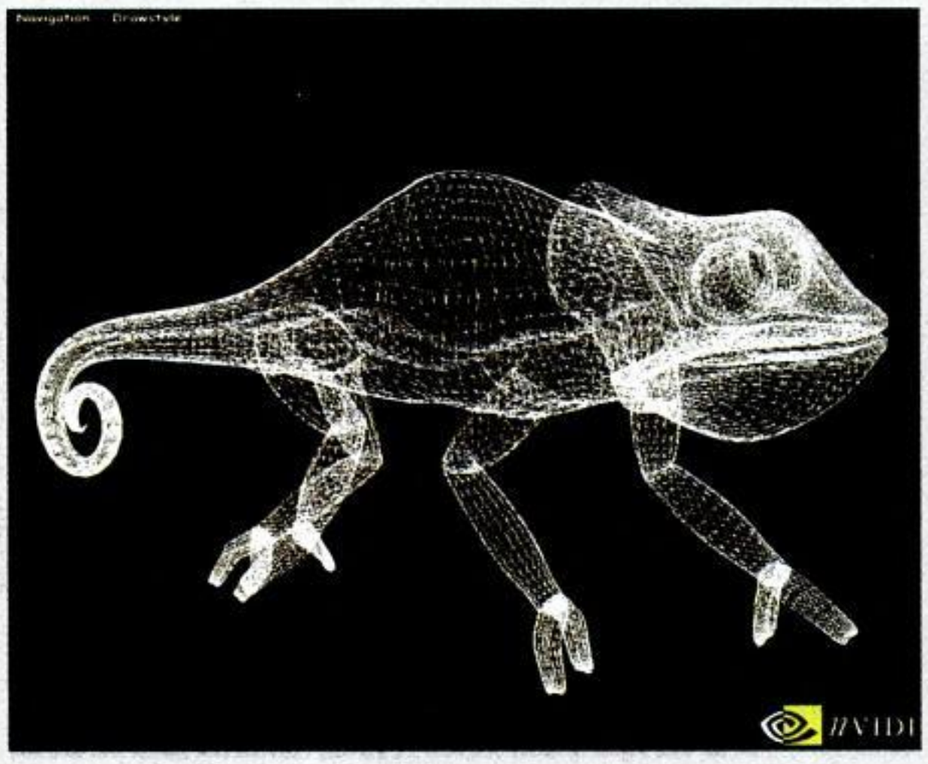
Copyrighted material

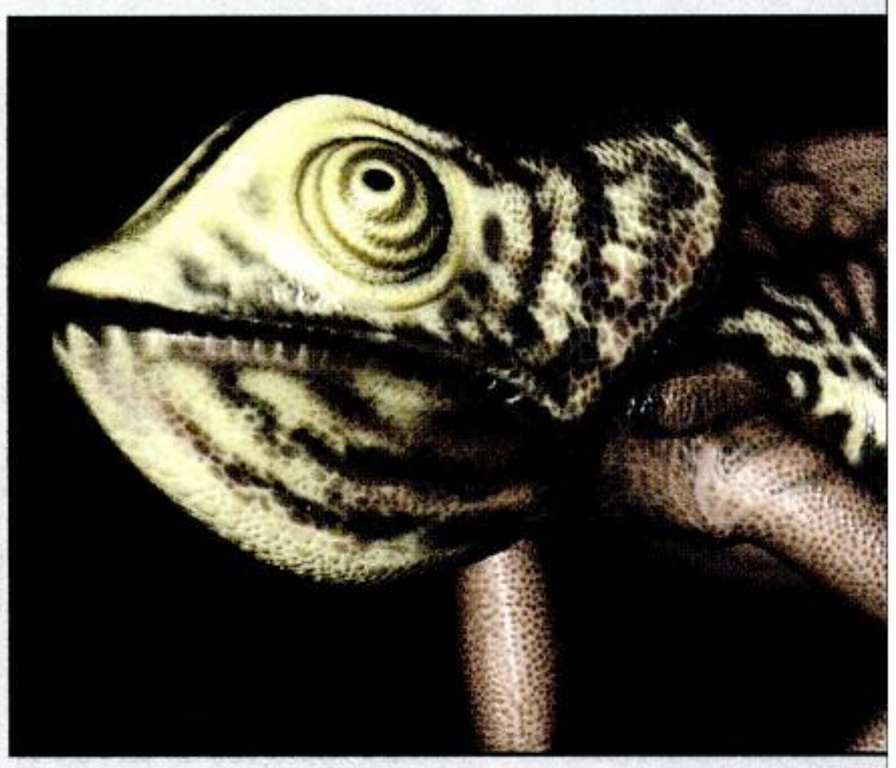
GeForce 3

Beauty of the Beast

Demo 1

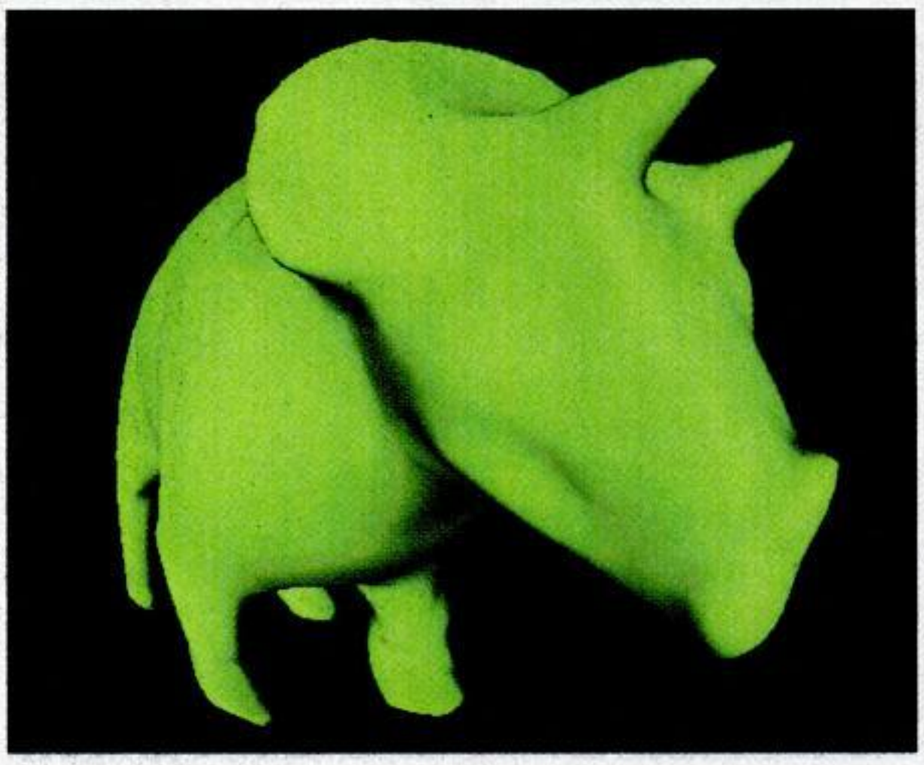
The wizards at nVidia created the Chameleon demo to show the power of the GeForce3's pixel shaders. In the first shot, we see the vast number of polygons that the chameleon is made up of. The second shot is a close-up of the chameleon's head, with bump-mapping enabled. The third shot demonstrates reflective Blinn Bump-mapping in action. Note that the bumps in the third shot actually reflect realistically; this is not just a shiny environment map, but rather real reflections of the environment around the chameleon!

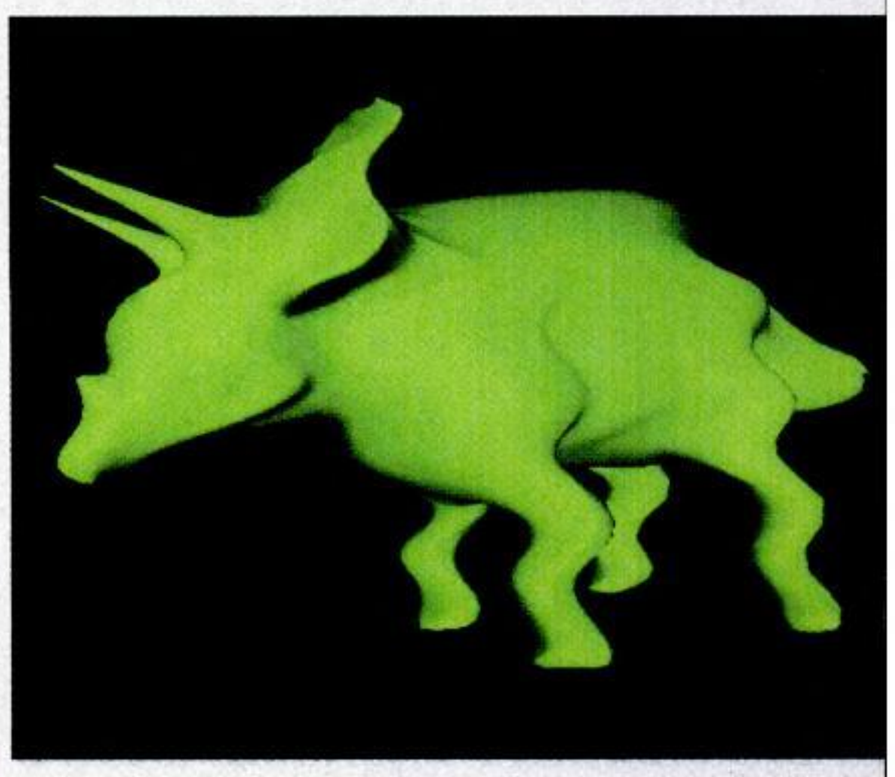




Demo 2

The Blobby Dino demo shows the power of the GeForce3's vertex shaders. Once a model is loaded into the GeForce3's memory, the developer can do whatever he wants to the individual vertices. The first image is the default model, before anything is done to it. The second image is what the dino looks like when it is stretched along the vertical plane. The final image is the result of a command to twist the model 90 degrees across one axis.





Demo 3

Our last set of screens shows off the GeForce3's new 3x Full-Screen Anti-Aliasing setting in a DirectX 8 game called *AquaNox*. By using a multi-sampling technique, the GeForce3 is capable of anti-aliasing that looks better than 2x, with only a negligible performance hit. The first image has anti-aliasing disabled. The second image has 3x anti-aliasing enabled. Note the vertical edges. The third image shows a split close-up of one of the antenna masts. The first shot has 3x anti-aliasing enabled; the second shot doesn't.

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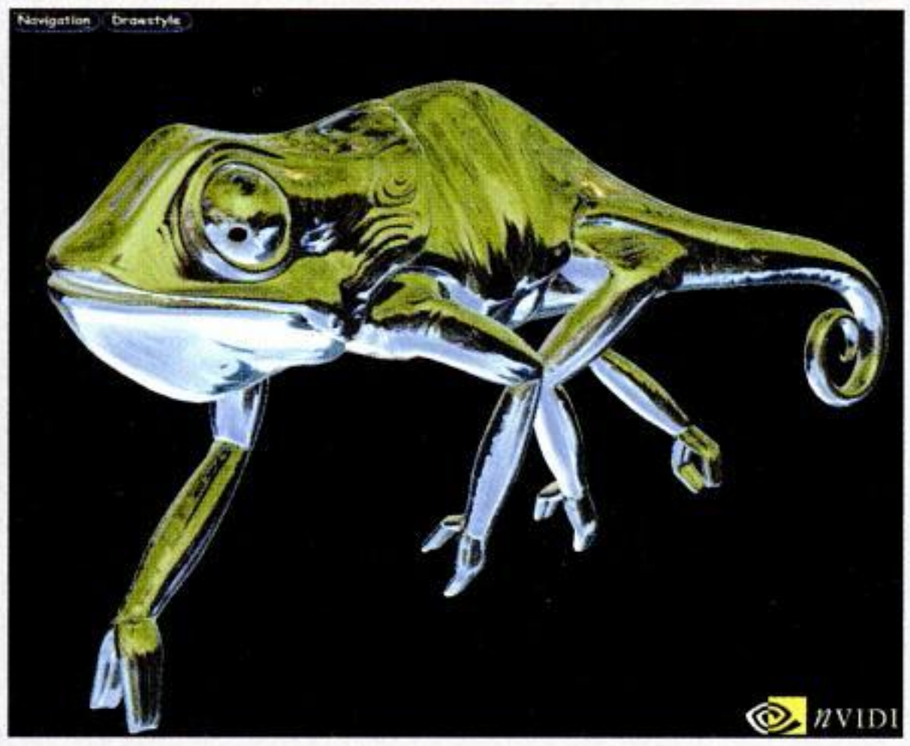
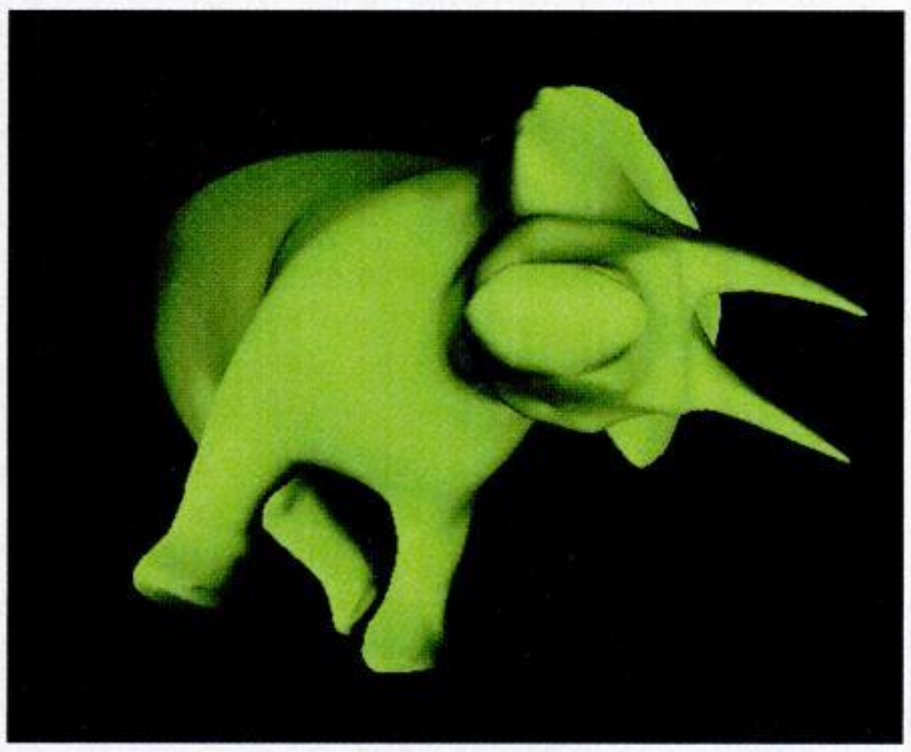
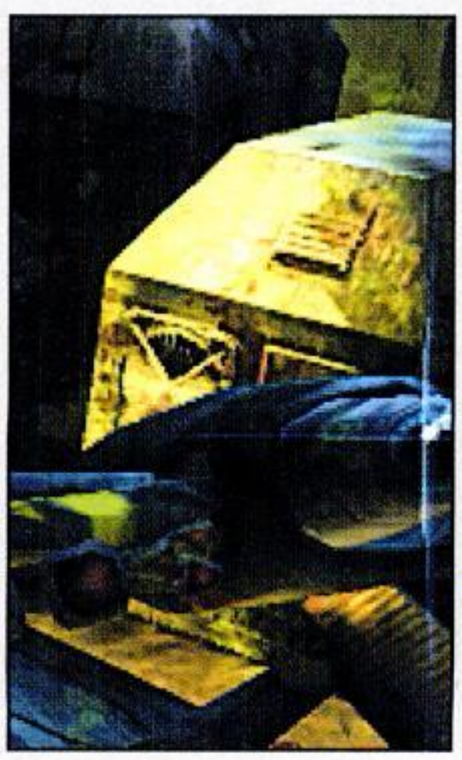
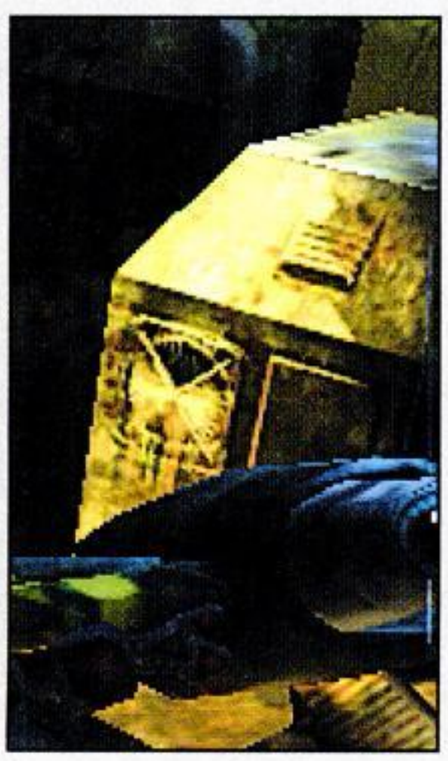
Here's a peak at the chipset's amazing visuals. These images are *not* pre-rendered. They came from realtime demos that we saw in action.









Inside the Developer's Studio

All the raw power of the GeForce3 will be wasted if it's not embraced by the developer community. We asked Tim Sweeney, who wrote the engine for *Unreal* and *Unreal Tournament*, a few questions about the new chipset.

MPC: What's the most exciting new feature of the GeForce3?
Sweeney: Without question, programmability is the killer feature. For the past five years, 3D games have been limited to a small, predetermined set of pixel-rendering and T&L features. Now game developers have total control over the entire rendering process. The difference in programmability is like comparing a desk calculator to a computer.

MPC: How will programmable vertex and pixel shaders affect game development times? Will developers raise minimum system requirements or develop different art for GeForce3-class accelerators and non-GeForce3-class accelerators?
Sweeney: The impact on development times is hard to nail down. On one hand, there are more features to exploit. On the other hand, the GeForce3 makes it easier to develop amazing-looking content, and more developers are using game engines like [those in] *Unreal* and *Quake*, reducing development time.

There will be more developer focus on GeForce3 than any new peripheral in the past. If you look at previous generations of 3D hardware, developers have done a fairly poor job of taking advantage of the latest features. Look at hardware T&L, for example. But all the rules change for GeForce3, thanks to two things. The programmability is the big one. It's not a checkbox item on your feature list as T&L was; it totally changes the game. Second, the Xbox phenomenon: Virtually all developers will be targeting Xbox, and not just as an afterthought—everybody is focusing on taking complete advantage of its features, which include all of nVidia's NV20 features. This developer focus will carry over to GeForce3 on the PC side.

Our strategy for the future, for games shipping 18-plus months from now, is to take total advantage of the GeForce3 feature set and offer a backwards-compatibility mode for older hardware.

MPC: Are you planning on implementing any of the really advanced features, such as procedurally generated texturing?
Sweeny: We have lots of really advanced features up and running, but we are working on more... We're really just scratching the surface of what's possible. The big advances now are in per-pixel lighting, supporting bump-mapping, and more realistic lighting models—anisotropic lighting and so on.

MPC: What feature would you most like to add to the GeForce3?
Sweeny: Oh, I could come up with a list that would double or triple the GeForce3's transistor count! But that wouldn't be a good idea. I think the GeForce3 hits the target head-on, in terms of delivering the maximum amount of performance and programmability at a good price.

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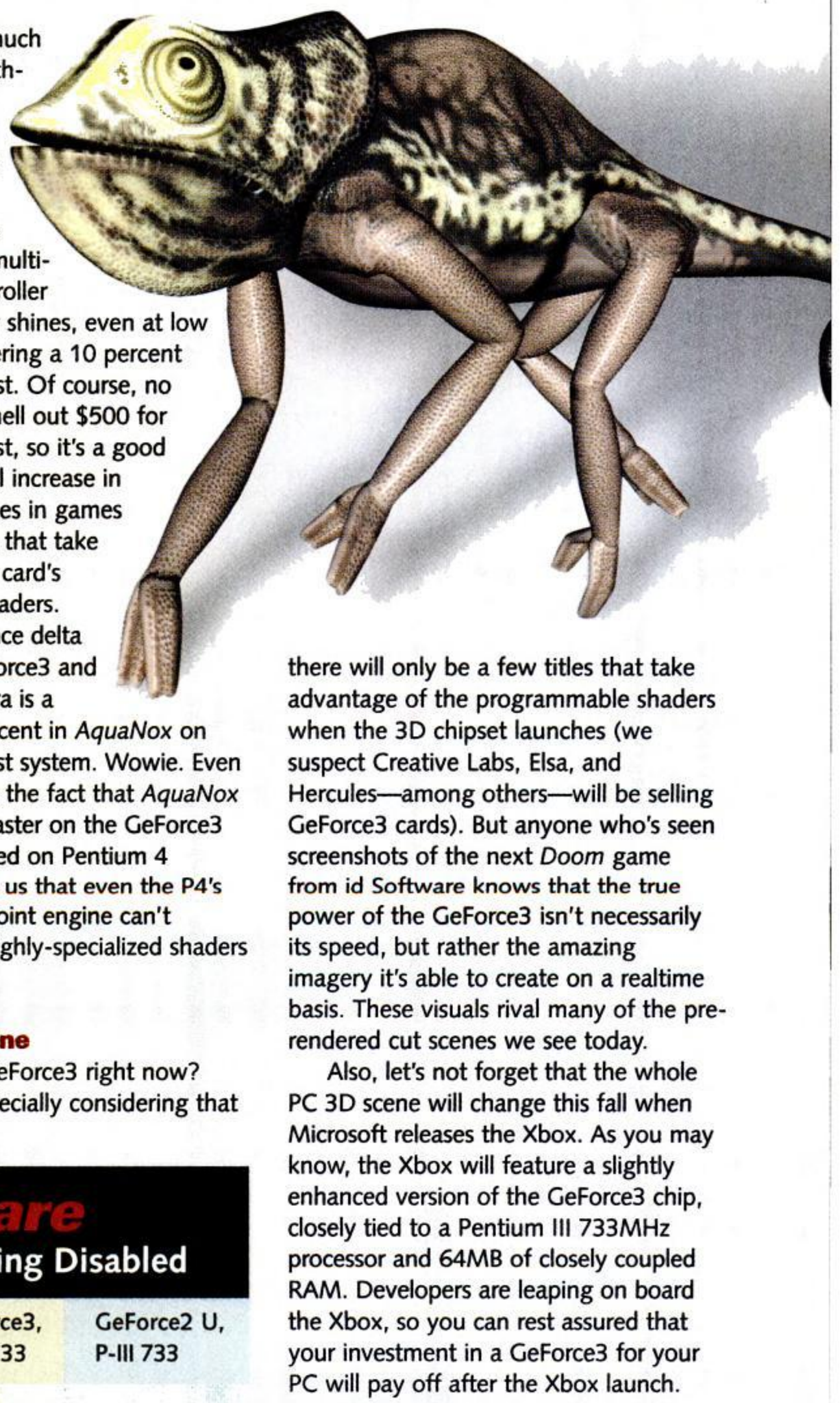
GeForce 3

How Fast Is It?

Now that you're familiar with the GeForce3's programmable shaders, it's time to learn how fast the card performs. Luckily, we were able to spend a day with an "early" GeForce3 board at nVidia HQ ("early" means the board was final, but the drivers weren't). In order to give you a point of reference, we took our own GeForce2 Ultra-based Hercules 3D Prophet II Ultra with us and used the new nVidia beta drivers to run benchmarks on both the GeForce3 and our GeForce2 card.

Both cards were benchmarked in *Maximum PC*'s own Pentium III 733MHz test system. We also ran the cards in a 1.4GHz Pentium 4 system with 256MB of memory, provided by nVidia. Naturally, we ran *Quake III* demo001 and Quaver. We also wanted to run something that would test the programmable shaders of the GeForce3, and, as luck would have it, nVidia was able to provide us with a beta version of *AquaNox*, a DirectX 8 game from Massive Development. Considering the beta condition of this game and the early version of the drivers we used, these benchmarks shouldn't be compared to other scores from other systems, but rather only to each other.

Because the GeForce3 is built on the GeForce2 core, the new card is only negligibly faster in games and benchmarks with traditional renderers and low poly counts, such *Quake III Arena*'s demo001. The *Quake III* Quaver demo, however, takes place in a much more heated deathmatch environment, chock-full of explosions and lighting effects. So in Quaver, the GeForce3's new multiple-memory controller architecture really shines, even at low resolutions, delivering a 10 percent performance boost. Of course, no one is going to shell out $500 for a 10 percent boost, so it's a good thing that the real increase in performance comes in games such as *AquaNox* that take advantage of the card's programmable shaders.



The performance delta between the GeForce3 and the GeForce2 Ultra is a staggering 78 percent in *AquaNox* on the Pentium III test system. Wowie. Even more promising is the fact that *AquaNox* runs 75 percent faster on the GeForce3 when benchmarked on Pentium 4 systems. This tells us that even the P4's mighty floating-point engine can't compare to the highly-specialized shaders of the GeForce3.

The Bottom Line

Do you need a GeForce3 right now? Probably not, especially considering that there will only be a few titles that take advantage of the programmable shaders when the 3D chipset launches (we suspect Creative Labs, Elsa, and Hercules—among others—will be selling GeForce3 cards). But anyone who's seen screenshots of the next *Doom* game from id Software knows that the true power of the GeForce3 isn't necessarily its speed, but rather the amazing imagery it's able to create on a realtime basis. These visuals rival many of the pre-rendered cut scenes we see today.

Also, let's not forget that the whole PC 3D scene will change this fall when Microsoft releases the Xbox. As you may know, the Xbox will feature a slightly enhanced version of the GeForce3 chip, closely tied to a Pentium III 733MHz processor and 64MB of closely coupled RAM. Developers are leaping on board the Xbox, so you can rest assured that your investment in a GeForce3 for your PC will pay off after the Xbox launch.

So when should you upgrade? As always, it depends on what you have now. If you have a card slower than a GeForce 256 DDR, the GeForce3 is probably a good bet. If you've got a GeForce2, a GeForce2 Ultra, or a Radeon, the GeForce3 provides no compelling reason for you to upgrade, since its performance is very similar to those cards in currently available games. The GeForce3 is a watershed moment in consumer-level 3D acceleration, but it's not for everyone. Yet.

Dare to Compare

Benchmarks with Anti-Aliasing Disabled

	GeForce3, P4 1.4	GeForce2 U, P4 1.4	GeForce3, P-III 733	GeForce2 U, P-III 733
***Quake III* demo001 1024x768x32-bit**	131.3fps	128fps	96fps	95.4fps
***Quake III* demo001 1280x1024x32-bit**	86.8fps	81.3fps	75.5fps	72.1fps
***Quake III* Quaver 1024x768x32-bit**	131.3fps	117.9fps	85.3fps	84.1fps
***AquaNox* 1024x768x32**	23fps	5.7fps	20.3fps	4.5fps

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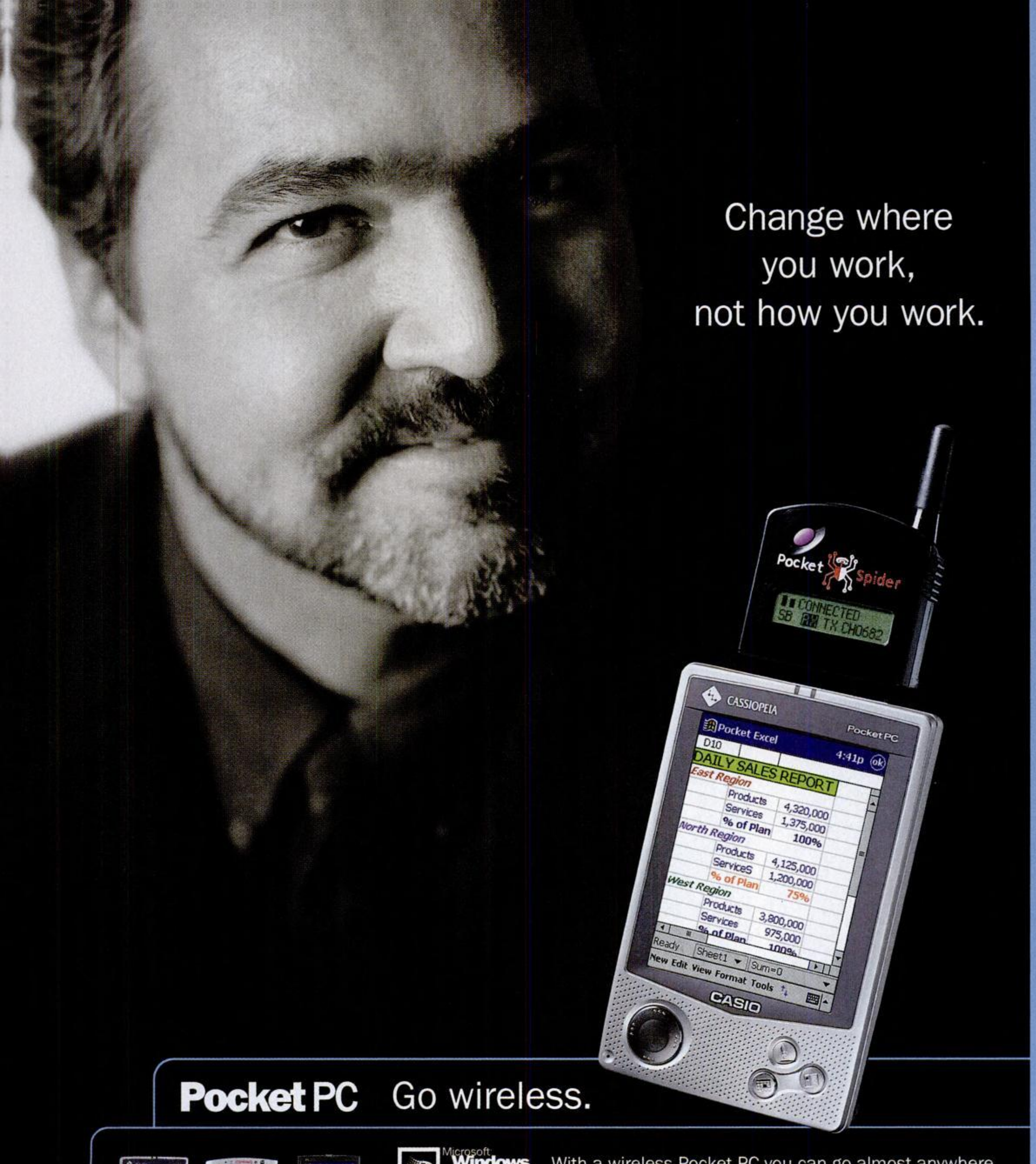

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*Instant messaging requires download of additional software. Modem and wireless service purchased separately. Check with GoAmerica for service availability in your area. Some web site content may be unavailable.

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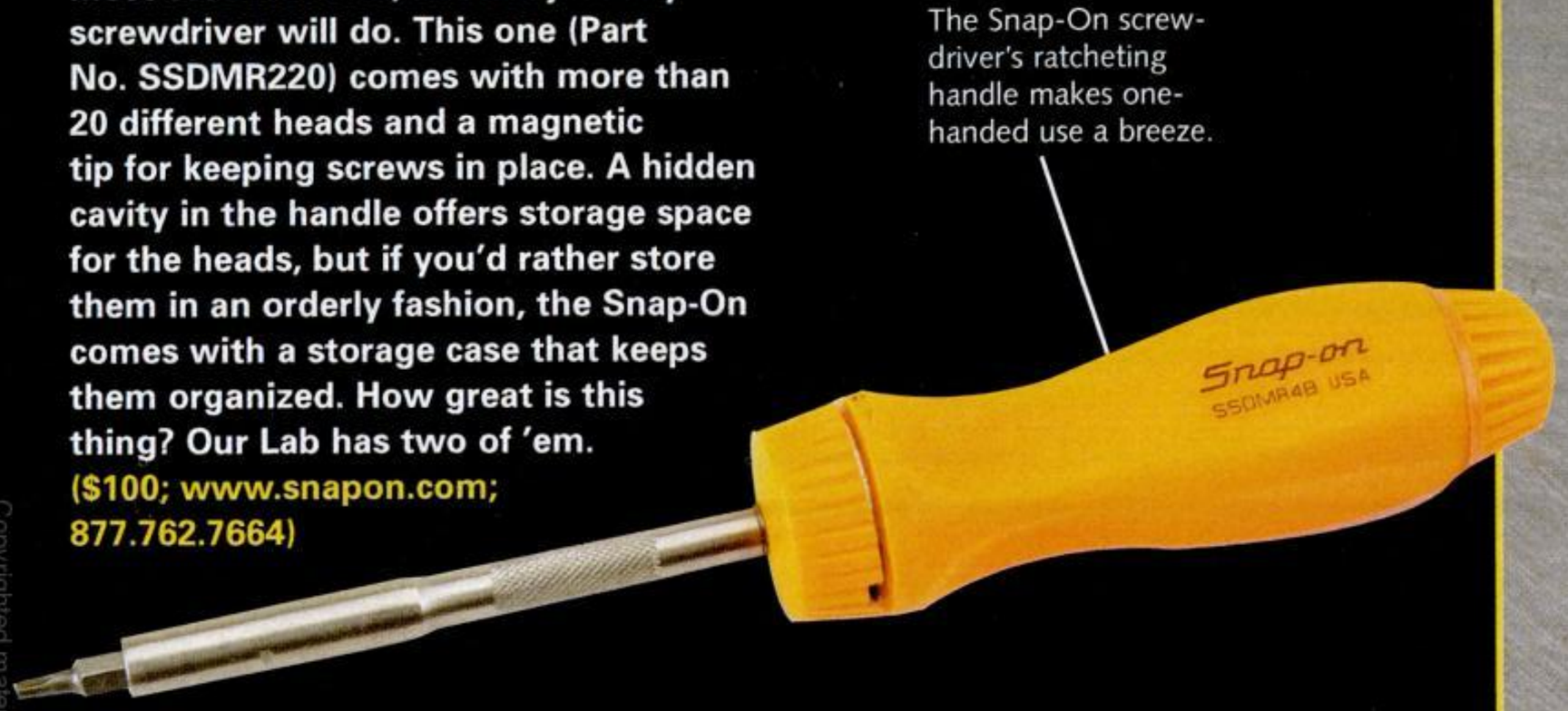
TOOLS of the TRADE

Want to be a proper hardware tweaker? You'll need the proper tools. Here are our picks for the essential tools that no hardcore PC workbench should be without.

Snap-On Screwdriver

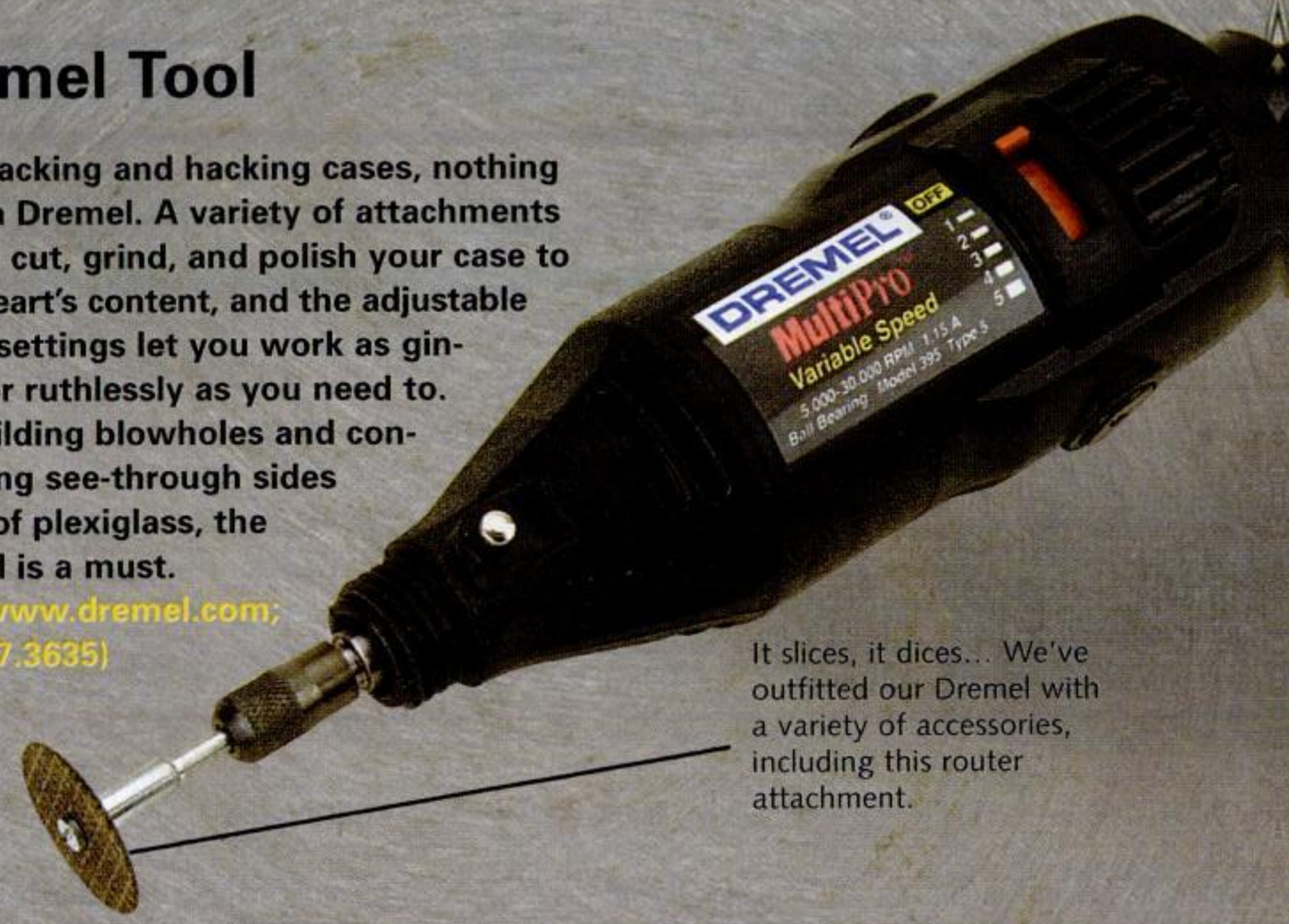
A screwdriver is the PC tweaker's most essential tool, but not just any screwdriver will do. This one (Part No. SSDMR220) comes with more than 20 different heads and a magnetic tip for keeping screws in place. A hidden cavity in the handle offers storage space for the heads, but if you'd rather store them in an orderly fashion, the Snap-On comes with a storage case that keeps them organized. How great is this thing? Our Lab has two of 'em. ($100; www.snapon.com; 877.762.7664)



The Snap-On screwdriver's ratcheting handle makes one-handed use a breeze.

Dremel Tool

For attacking and hacking cases, nothing beats a Dremel. A variety of attachments let you cut, grind, and polish your case to your heart's content, and the adjustable speed settings let you work as gingerly or ruthlessly as you need to. For building blowholes and constructing see-through sides made of plexiglass, the Dremel is a must. ($80; www.dremel.com; 800.437.3635)



It slices, it dices... We've outfitted our Dremel with a variety of accessories, including this router attachment.

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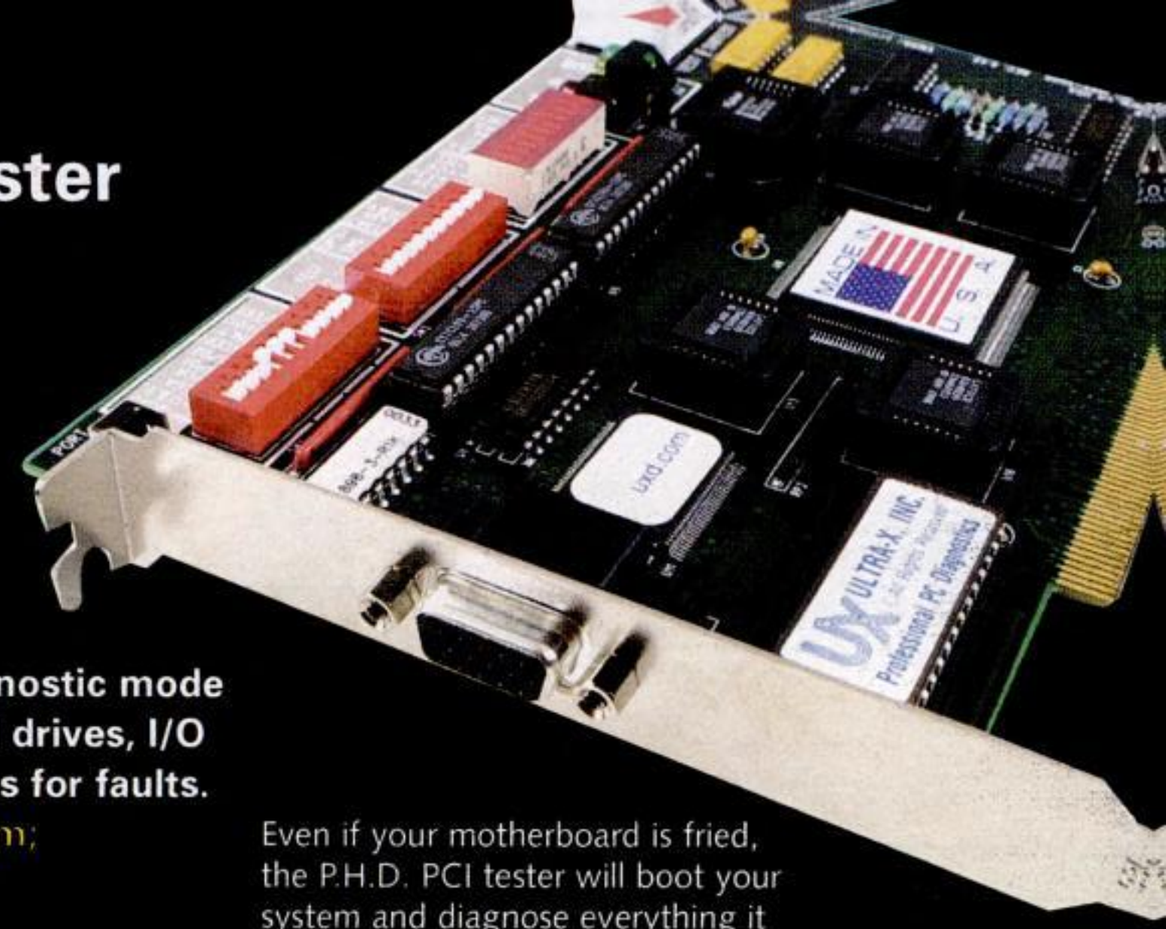
Fluke C550 Tool Bag

Forget about a clunky old metal box—store your tweaking tools in the Fluke C550 steel-reinforced nylon case. With more than 20 pockets scattered throughout its roomy body, even extraneous items such as screws and jumpers can be kept organized. The C550's reinforced bottom means the bag won't sag or jumble all your tools into a big mess. And the contoured strap makes for easy, comfortable carrying. ($60; www.fluke.com; 800.443.5853)

It's yellow and black—Fluke's colors—and the bag's bright character will keep you from tripping over it while your mind is busy paying attention to your system instead of where you're going.

P.H.D. PCI Tester

The doctor is in! When plugged into a PCI slot on your motherboard, the P.H.D. PCI tester can diagnose everything from motherboard problems to power supply fluctuations. An extended diagnostic mode tests floppy drives, hard drives, I/O ports, and even monitors for faults. ($1,000; www.ultra-x.com; 800.722.3789)



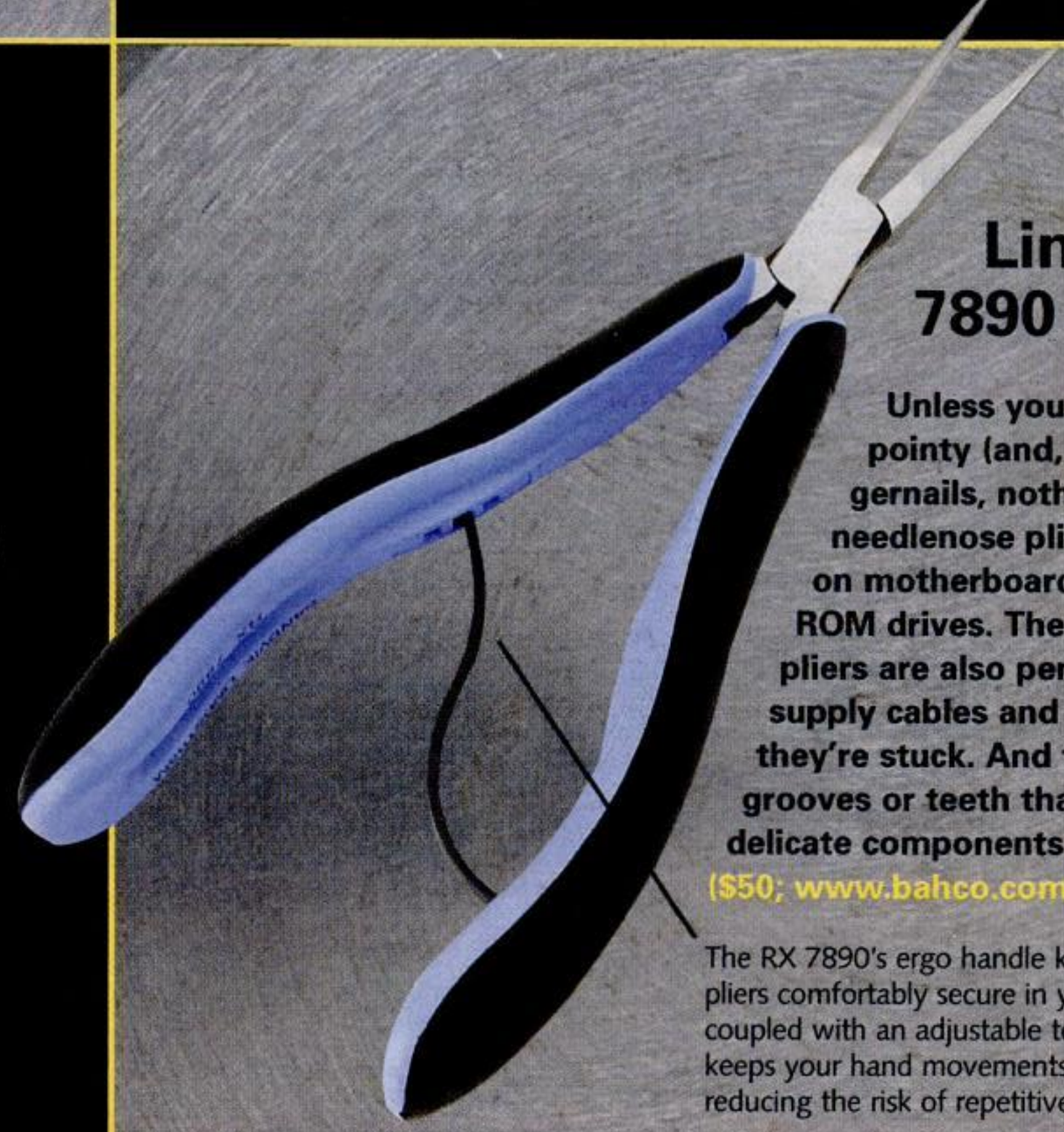
Even if your motherboard is fried, the P.H.D. PCI tester will boot your system and diagnose everything it can. Wondering whether your Athlon will work with a certain power supply? This provides the answer.

ATX POWER-TESTER INSTRUCTIONS
1) Unplug the AC line cord from the power supply.
2) Unplug the power supply's connectors from the PC.
3) Plug the Power-Tester into the power supply's 20-pin connector.
4) Plug the AC line cord into the power supply.
5) If the LED lights (view the top), the power supply is good.
pcpowercooling.com
Raychem

ATX Power Supply Tester

What's your power supply's actual juice output? PC Power & Cooling's cheap and handy ATX Power Supply Tester is a must. Just unplug the power connector from the motherboard and plug the tester in to find out whether your power supply is working as it should. ($10; www.pcpowerandcooling.com; 800.722.6555)

The LED is the key—if it lights up, your power supply is good. If not...well, it's time to shop for some new juice.



Lindstrom RX 7890 Pliers

Unless you have especially long, pointy (and, frankly, frightening) fingernails, nothing beats a good pair of needlenose pliers for moving jumpers on motherboards, hard drives, and CD-ROM drives. The Lindstrom RX 7890 pliers are also perfect for grabbing power-supply cables and "nudging" them when they're stuck. And the jaws are free from grooves or teeth that might damage delicate components. ($50; www.bahco.com; 714.921.9950)

The RX 7890's ergo handle keeps the pliers comfortably secure in your paws—and it's coupled with an adjustable tension spring that keeps your hand movements to a minimum, reducing the risk of repetitive-stress injuries (RSI).

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TOOLS of the TRADE

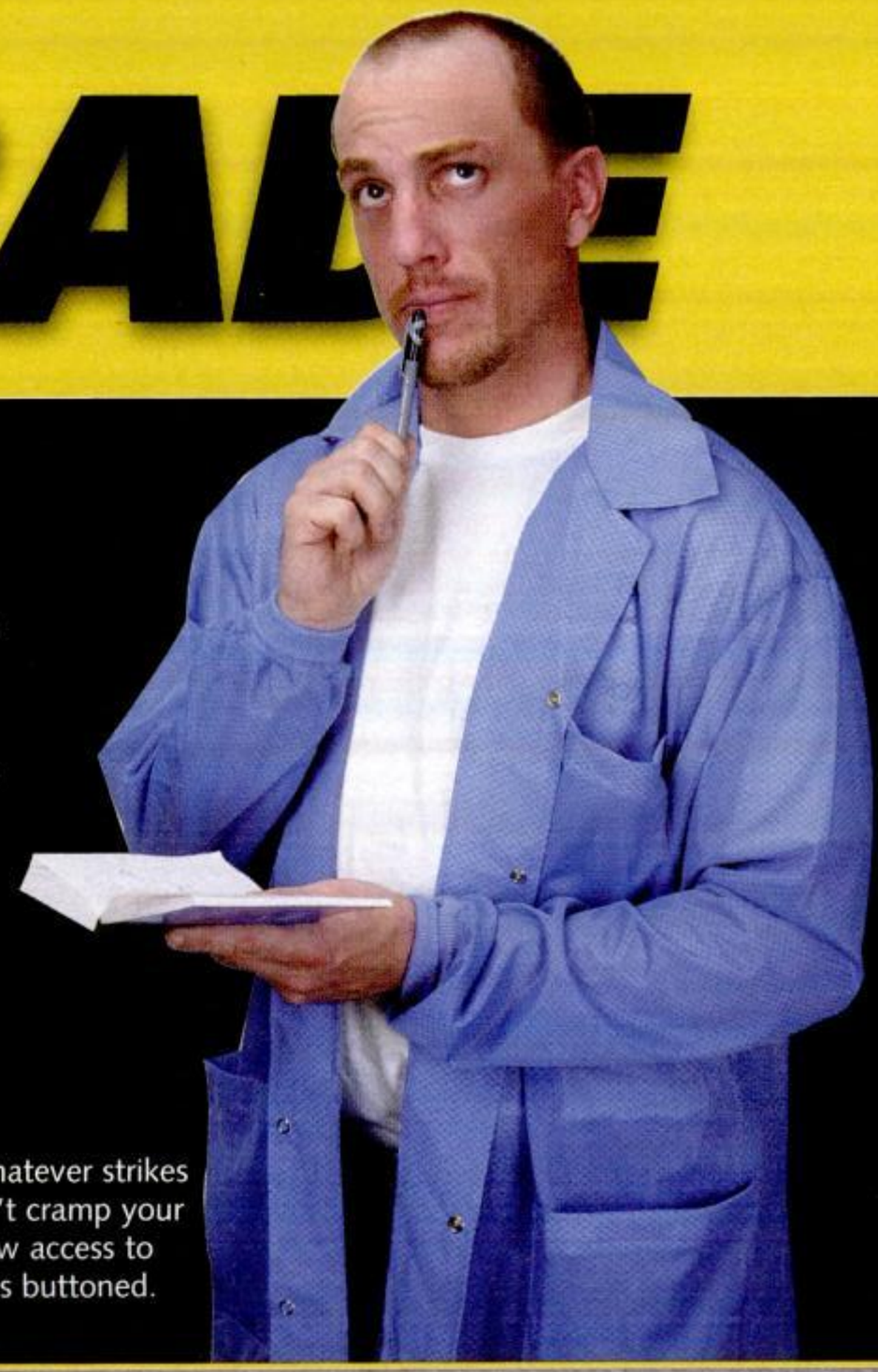
MetCal SP200 Soldering Station

True tweakers do not try to connect the L2 cache contact points on their Duron with pencil lead. The MetCal SP200 soldering station is the real McCoy. This baby will go from zero to soldering in about 15 seconds. Shut the power down, dip the soldering tip in the wet sponge tray, and remove it with your bare fingers—no need to wait for a tip to cool down before changing it. It's no-fuss, no-muss, and it makes the soldering process a snap. ($300; www.metcal.com; 800.776.1778)

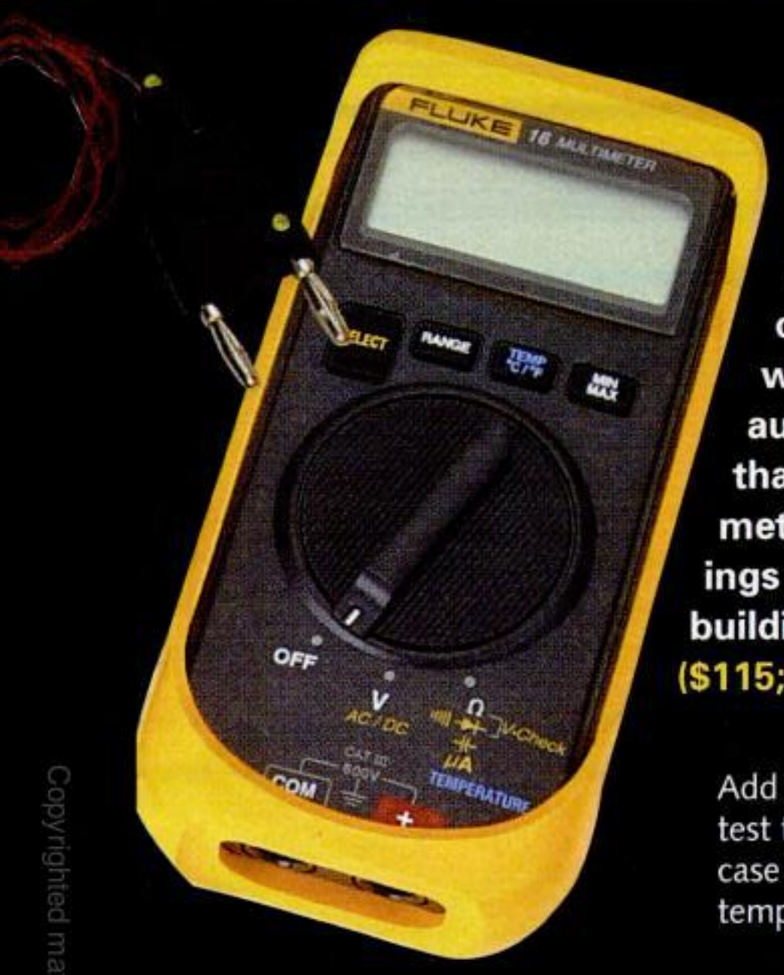
The SP200's various tips—from small and narrow to wide and flat—allow for serious soldering versatility.

Desco Lab Coat

You might as well look the part—plus, Desco's Statshield lab coat is a great antistatic garment, since it's interwoven with carbon fibers that allow electrostatic discharges to course through the coat into a grounding strap. Used correctly, the Lab Coat eliminates the need to tether yourself with an antistatic wrist strap. ($40; www.desco.com; 909.627.8178)



With three pockets to hold whatever strikes your fancy, the Lab Coat won't cramp your style. And slits at the hips allow access to pants pockets when the coat is buttoned.



Fluke 16 Multimeter with Thermometer

Check everything from the power at your wall outlet to the continuity of your power supply with the Fluke 16 multimeter. The Fluke 16's audible signals let you listen for readings, rather than having to glance back and forth from multimeter to PC. It even provides capacitance readings up to 10,000 microfarads—useful if you're into building your own electrical components. ($115; www.fluke.com; 800.443.5853)

Add the 80BK temperature probe and the Fluke 16 can test temperatures inside your case so you can maximize case cooling. Oh, and did we mention that it'll measure temperatures from -40 to 750 degrees Fahrenheit?

ESD Field Service Antistatic Kit

Complete with antistatic mat, grounding cord, and antistatic wrist strap, Desco's ESD Field Service Kit will let you work on your system just about anywhere without worrying that a static electricity zap will fry your shiny, new GeForce2 Ultra card like a Denver omelet. ($55; www.desco.com; 909.627.8178)

The ESD Field Service Kit comes with a nice canvas carrying bag. Who says we don't care about aesthetics? Just be sure to actually ground the antistatic mat before you use it.

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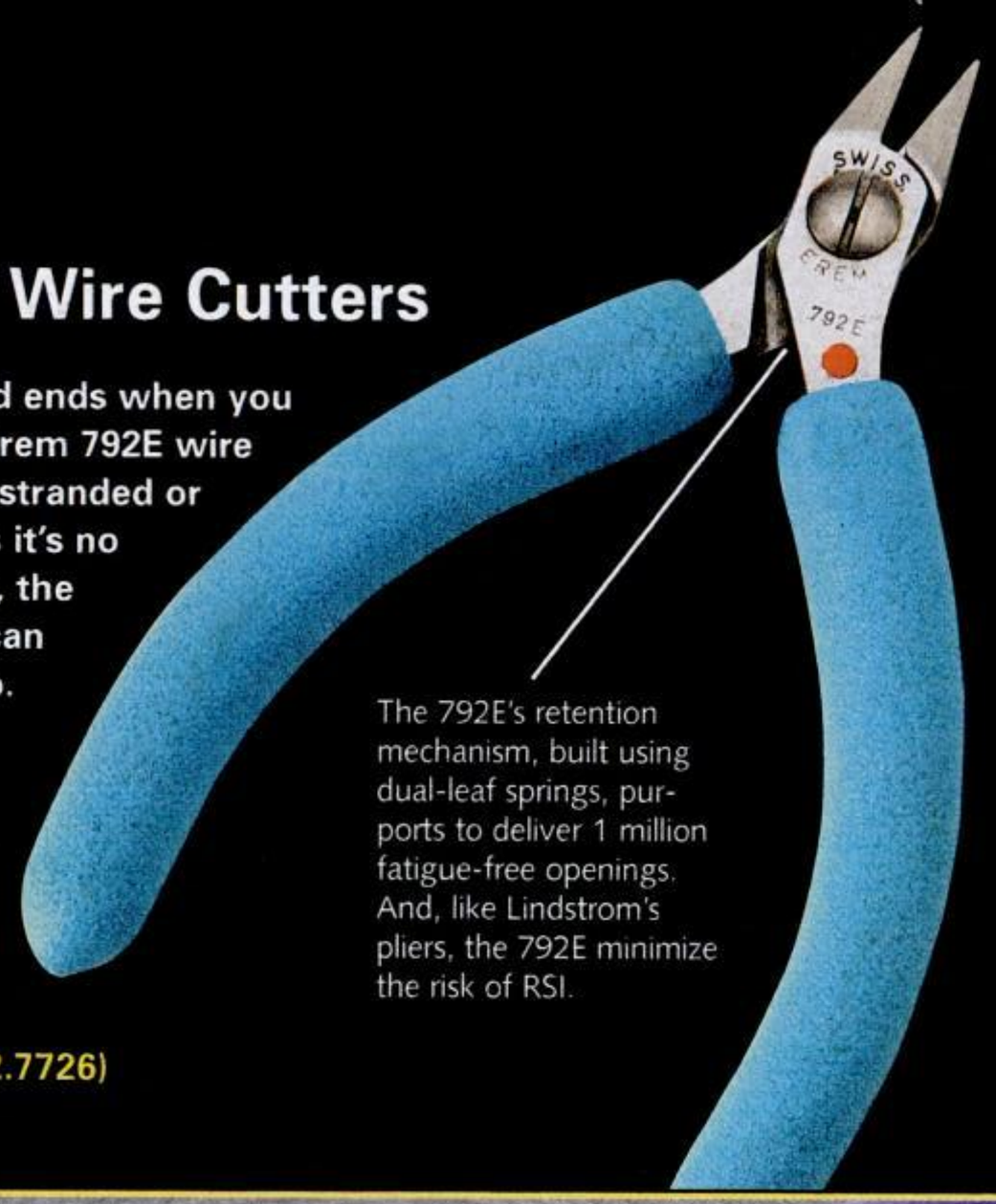
PerfectData StatFree Antistatic Spray

The ESD Field Service Kit will keep you from delivering the final blow to your components, but it won't do much to protect against the chairs and carpet in your office that are essentially miniature lightning storehouses. So douse your office furniture with antistatic spray to keep them from zapping you when you least expect it. Note: This stuff isn't meant to be sprayed on your electronics. ($5; www.frys.com; 408.617.1300)

Erem 792E Wire Cutters



Eliminate egg-shaped ends when you cut a wire with the Erem 792E wire cutters. Whether it's stranded or solid wire, as long as it's no larger than 14 gauge, the 792E's cutting edge can tackle it with aplomb. Erem thoughtfully equipped the grips with ESD-safe foam, which puts the kibosh on electrostatic discharges. ($60; www.wassco.com; 800.492.7726)

The 792E's retention mechanism, built using dual-leaf springs, purports to deliver 1 million fatigue-free openings. And, like Lindstrom's pliers, the 792E minimize the risk of RSI.

Leatherman Wave

Granted, most of the tools crammed into the Leatherman Wave's compact shape are already on your workbench in larger forms. But, if nothing else, it's comforting to know that the Wave's battalion of pliers, scissors, screwdrivers, file, and wood saw are there as a backup. There's even a bottle opener for popping the top off a cold one after you've finished the job. ($100; www.leatherman.com; 800.847.8665)

Leatherman built the Wave from 100-percent, tough-as-nails (literally) stainless steel.

Mini-MAG Light

Penetrate the darkest recesses of your case with the Mini-MAG's great focusing ability. Since it's so small, the Mini-MAG Light will fit with ease into even the smallest cases. ($10; www.maglight.com; 800.289.6241)

The Mini-MAG's cool case is designed to fit on your belt, freeing up space inside your tool bag and keeping it handy at all times. Yes, we are big, big geeks.

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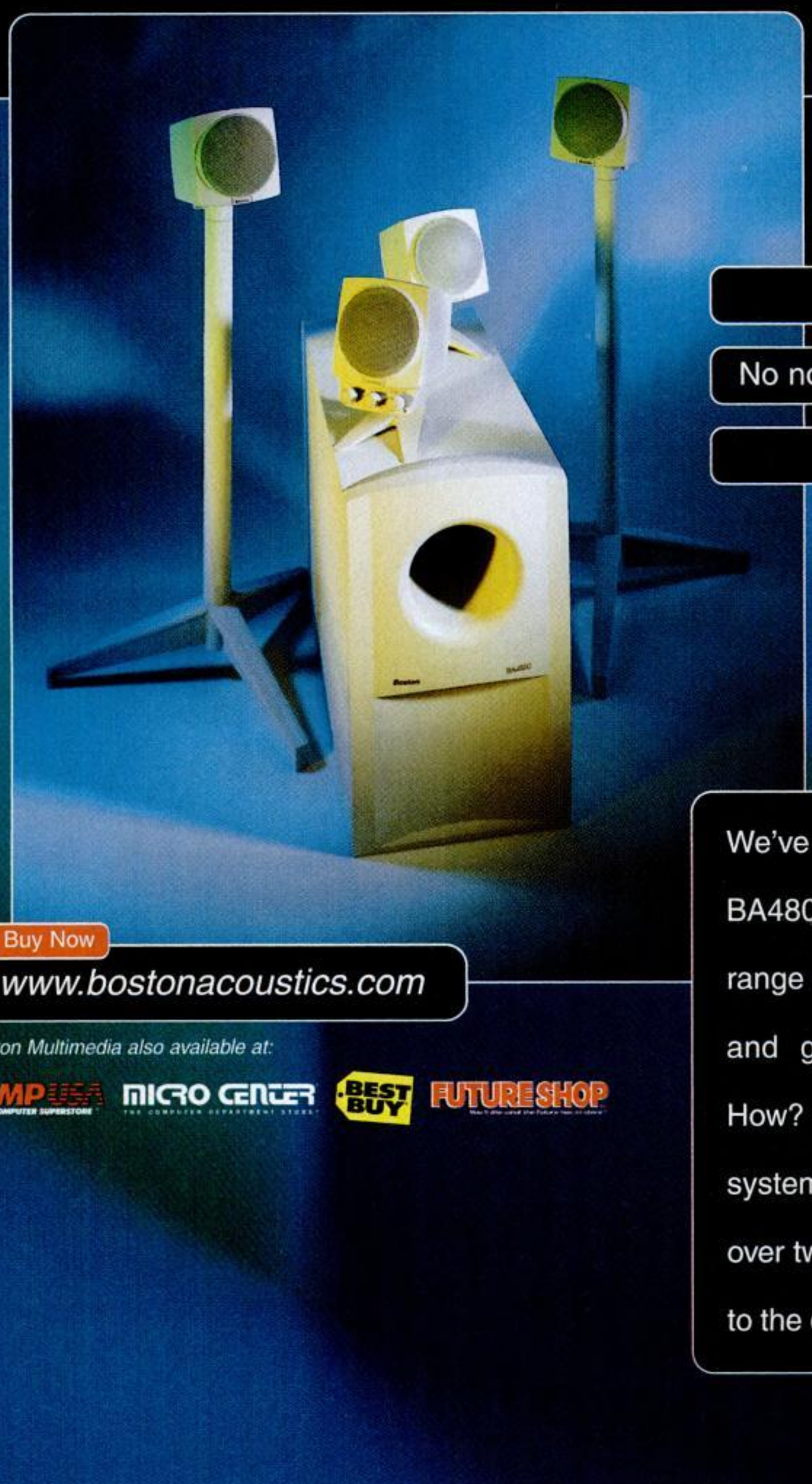

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TOOLS of the TRADE

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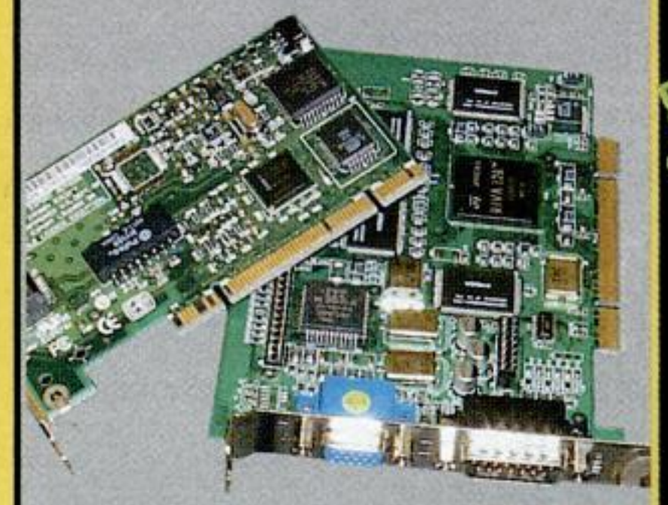

Spare NIC/videocard

Goes a long way toward helping to diagnose pesky problems.

Zip Ties

For tucking away wires and cables inside your case.

Dust-Off
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Compressed air

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Assorted cables and screws

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Various tapes (masking, electrical, etc.)

Whether you're painting your case or splicing wires, you'll need it. Also useful for keeping people quiet while you work.

Measuring device

Crucial if you're going to be cutting into your case.

Thermal compound

We're partial to Wakefield thermal compound (**www.melcor.com**).

Precision screwdrivers

The Snap-On doesn't have the small heads you need when working on laptops.

Nylon probes

For scraping off old, crusted thermal compound without destroying your proc.

Pad and pen

For creating templates if you're going to be cutting your case.

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PIXEL FIX

Whip your digital images into shape

BY CARLA ROSE

You can't always get what you want, but there's no reason you can't make what you get more attractive. Film photographers who do their own darkroom work do lots to improve their photos. Digital photographers can do the same, using a digital darkroom program.

We've used *Photoshop LE* to make corrections on the following photo album, but most digital darkroom programs include the same basic tools and options. Check out page 51 for an overview of digital (and film) photography terminology and tools—and check out the Maximum CD for a *Photoshop LE* demo of your very own.

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Cropping, Contrast, and Saturation

Though the picture below is itself engaging, the animals are too far away and the color and contrast are washed out. Start by cropping away the extra space to make the zebras seem closer, then increase the contrast and brightness of the overall scene.

BEFORE

When you're adjusting the contrast, use the sky and the darkest and lightest parts of the picture—in this case, the zebras—as a guide. We upped the brightness by 8 and the contrast by 16.

Flipping the zebra on the left is going to leave a piece of fence in the background that seems to have appeared from nowhere. Copy and paste some extra bushes over it.

Use the saturation sponge to increase the contrast of the zebra stripes even more, which will make the zebras "pop" off the page. Use a medium-sized, soft-edged brush, and keep the saturation pressure at about 25 percent so you don't overdo the correction.

If only the zebra on the left had been facing the other direction, the picture would look more balanced. No problem: Use the lasso tool to select the zebra and the grass he's standing on. Cut and paste the selection onto a new layer, and flip it so the zebra is facing the other way. When he's where you want him, flatten the image.

Do away with those unsightly "zebra patties" littering the ground by selecting some clean grass with the lasso tool, then copying and pasting it over the offending areas.

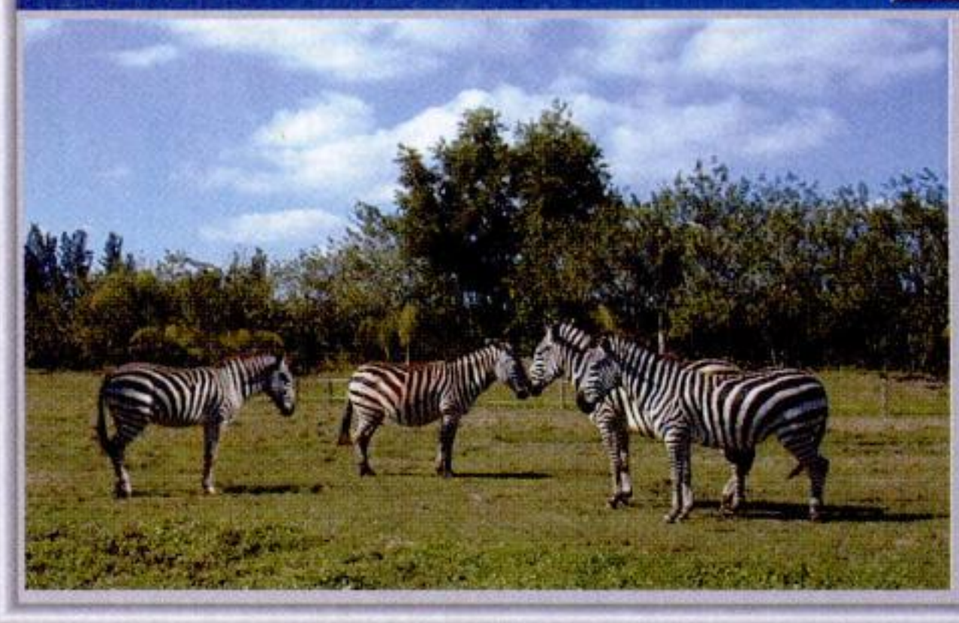
CORRECTING YOUR CAMERA TECHNIQUE

Shooting animals is tricky. In this case, the following would have helped:

- Getting closer would have produced a better shot overall, but since triggering a zebra stampede is a legitimate concern, a telephoto lens would have been the way to go.

- A longer exposure would have increased the picture's color saturation, resulting in higher contrast.

AFTER



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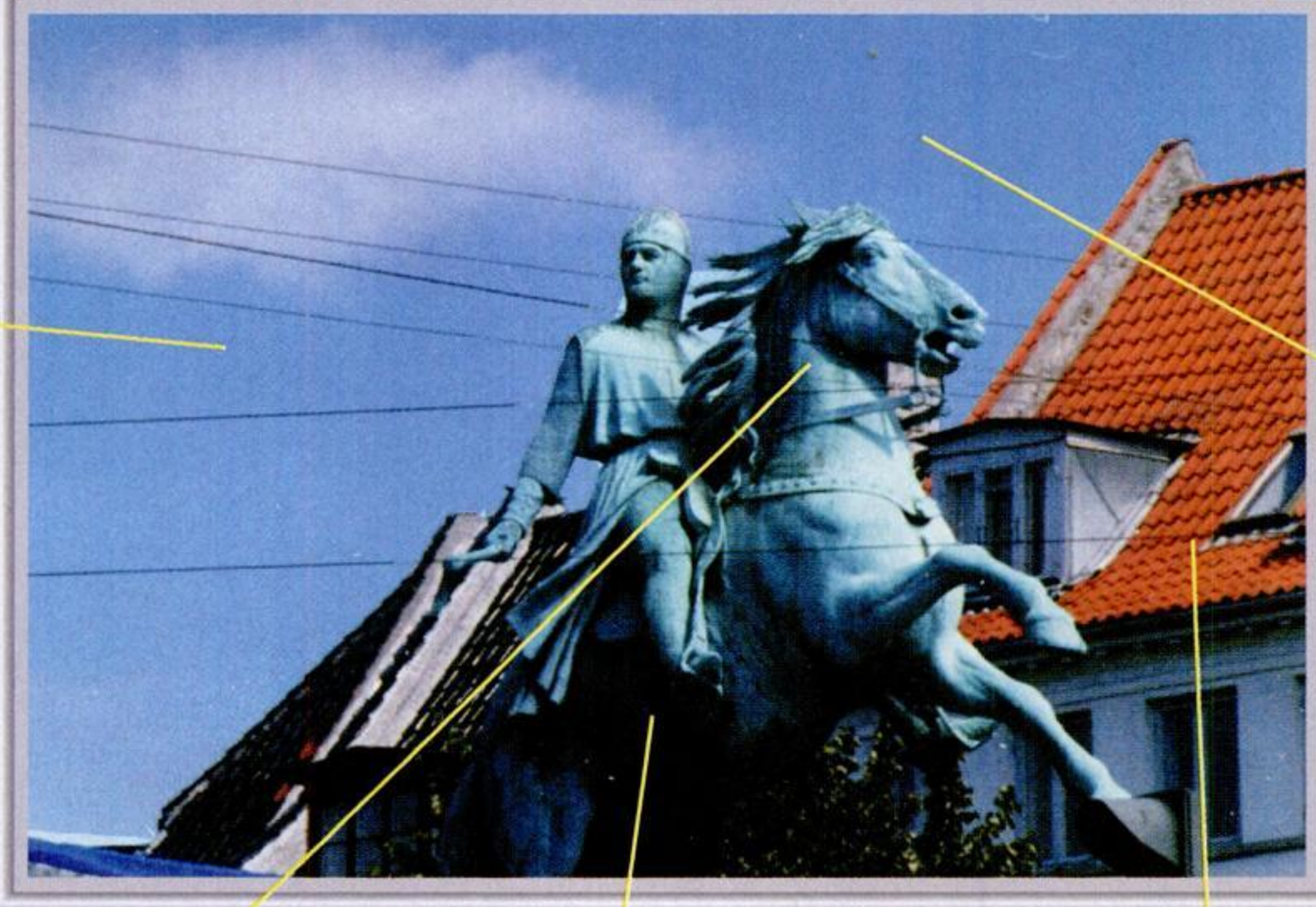
Rubber Stamping

This photo is marred by the network of telephone lines running through it. There are several ways to remove the nasty wires.

BEFORE



Use the rubber stamp tool to clone pieces of the sky and simply stamp the lines out. Matching the sky color is important, so remember to keep changing the clone source as you stamp. Use a small or medium soft-edged brush.

The photo could also use a run through the Dust and Scratches filter.

Fine lines can often be covered using the smudge tool; it works like rubbing your finger over a chalk drawing, blending the line into whatever surrounds it. If you enlarge the image and use a small brush size, you can actually move individual pixels around.

This image was scanned, so it looks a bit smudgy overall. The Unsharp Mask filter—applied in this case at 30 percent, with a radius set to 2 pixels and a threshold of 3—cleans things up nicely. Be careful not to overdo it with this tool,or you'll end up losing detail.

To hide the lines on the roof, use the lasso tool to select a small block of tiles above the area where the lines pass through. Paste the block over the wires—but remember to place the pasted section so that the patterns line up.

AFTER

CORRECTING YOUR CAMERA TECHNIQUE

- Consider shooting from a different angle to minimize the intrusive power lines.
- If your camera has manual settings, shoot with a fast shutter speed and lower f-stop. This will limit the depth of field, which may be enough to blur out the background clutter while keeping the subject in focus.

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Adjusting Color, Straightening

The photo is darker than we'd like and has a yellow cast. We used* Photoshop LE*'s Variations tool to correct the overall color, essentially adding some blue to compensate for the yellowish tint.

BEFORE

Those little specks in the sky—they appear to be helicopters—are ruining our lovely sea shot. Use the rubber stamp tool to get rid of the pesky little flecks.

The photo was scanned at an angle. To straighten the horizon and correct the boat's downhill course, select the whole photo and rotate it counterclockwise a half-degree at a time until everything looks right. Then crop the picture to make the corners square again.

Adjusting the overall brightness and contrast will add some sunshine. Set brightness at 15 and saturation at 10. Always check the preview box before OKing these sorts of changes—it's easier to add brightness and saturation than to take them away.

CORRECTING YOUR CAMERA TECHNIQUE

You can't do much about the weather, but you can make adjustments to deal with whatever Mother Nature has given you.

- When the sky is a flat gray and colors are subdued, adjust the exposure to make a darker, more saturated photo.

- If your camera has a white-balance setting, be sure it's set correctly. White balance compensates for the differences in color perception in sunlight, overcast conditions, and indoors. Raising white balance adds a cool blue tinge; lowering it makes the colors appear warmer and more yellow.

AFTER

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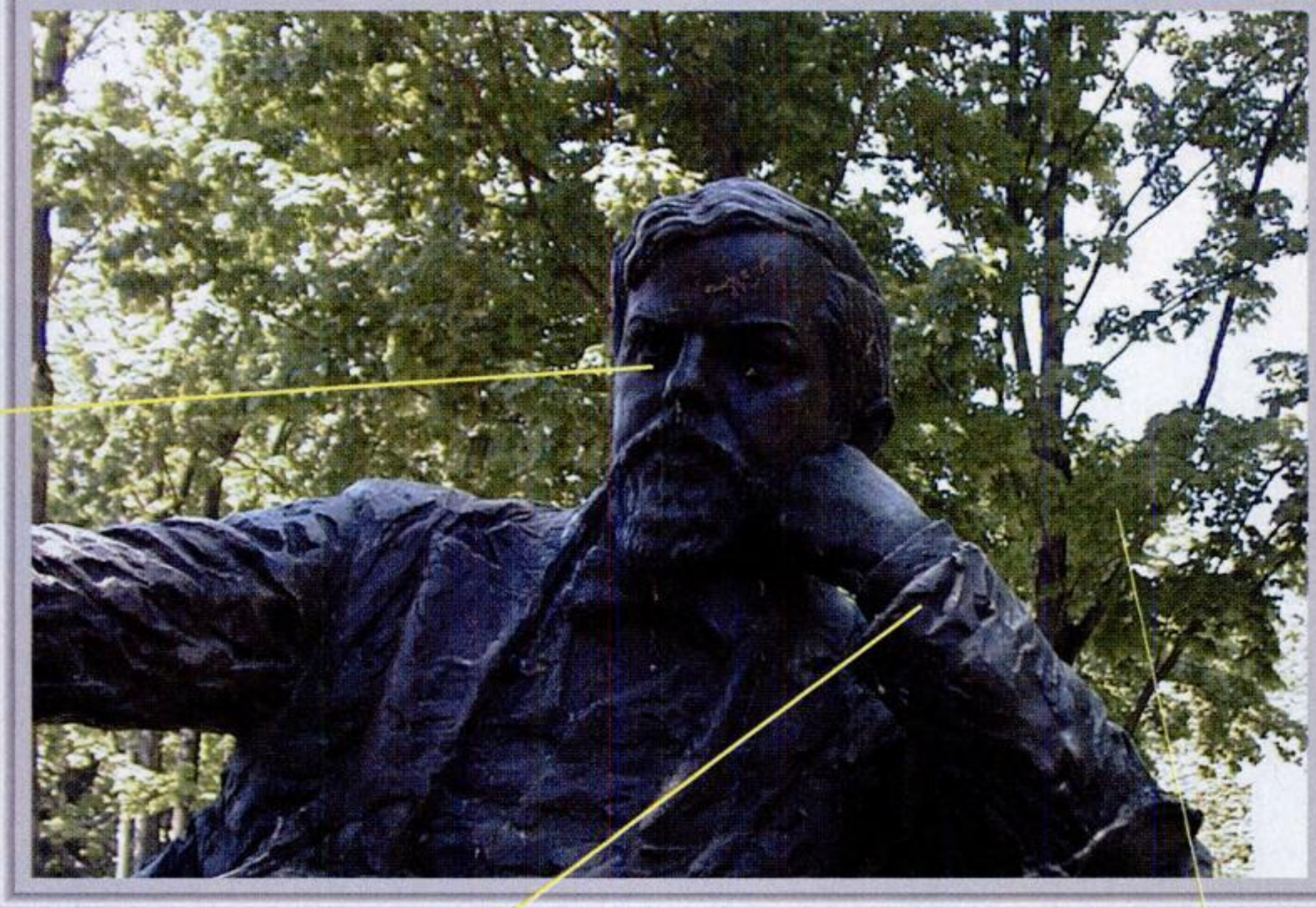
Dodging and Burning

Sometimes you want to lighten or darken certain parts of a picture in order to bring out details. That's where dodging and burning come in. Make your changes in small increments, though—it's always easier to add more correction than to undo the effects of too much.

BEFORE

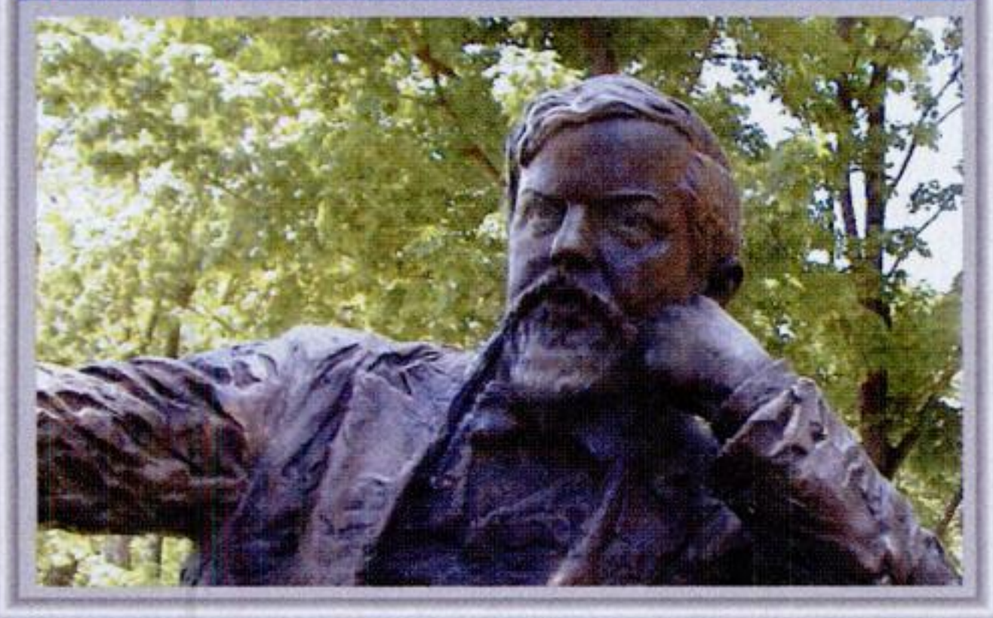


To reveal detail, dodge the shadows around the statue's eyes. Use a soft-edged brush at no more than 30 percent exposure. Also dodge the hand and chin to lighten them.

Burn the distracting highlight beneath the wrist, using a small, soft-edged brush. Burn the leaves and tree trunk on the right side using a large brush and less than 25 percent exposure.

Adjust the hue/saturation to deepen the green in the trees. Watch the preview as you change settings. You'll know when it looks right.

AFTER



CORRECTING YOUR CAMERA TECHNIQUE

- Though there was plenty of light outside when the photo was shot, the statue was in shadow, so a flash would have been appropriate.

- Take a good look at the subject before you shoot. If there are flaws that can be attended to before you press the shutter, you'll save time later on. In this case, we should have considered wiping the dust off the statue's face.

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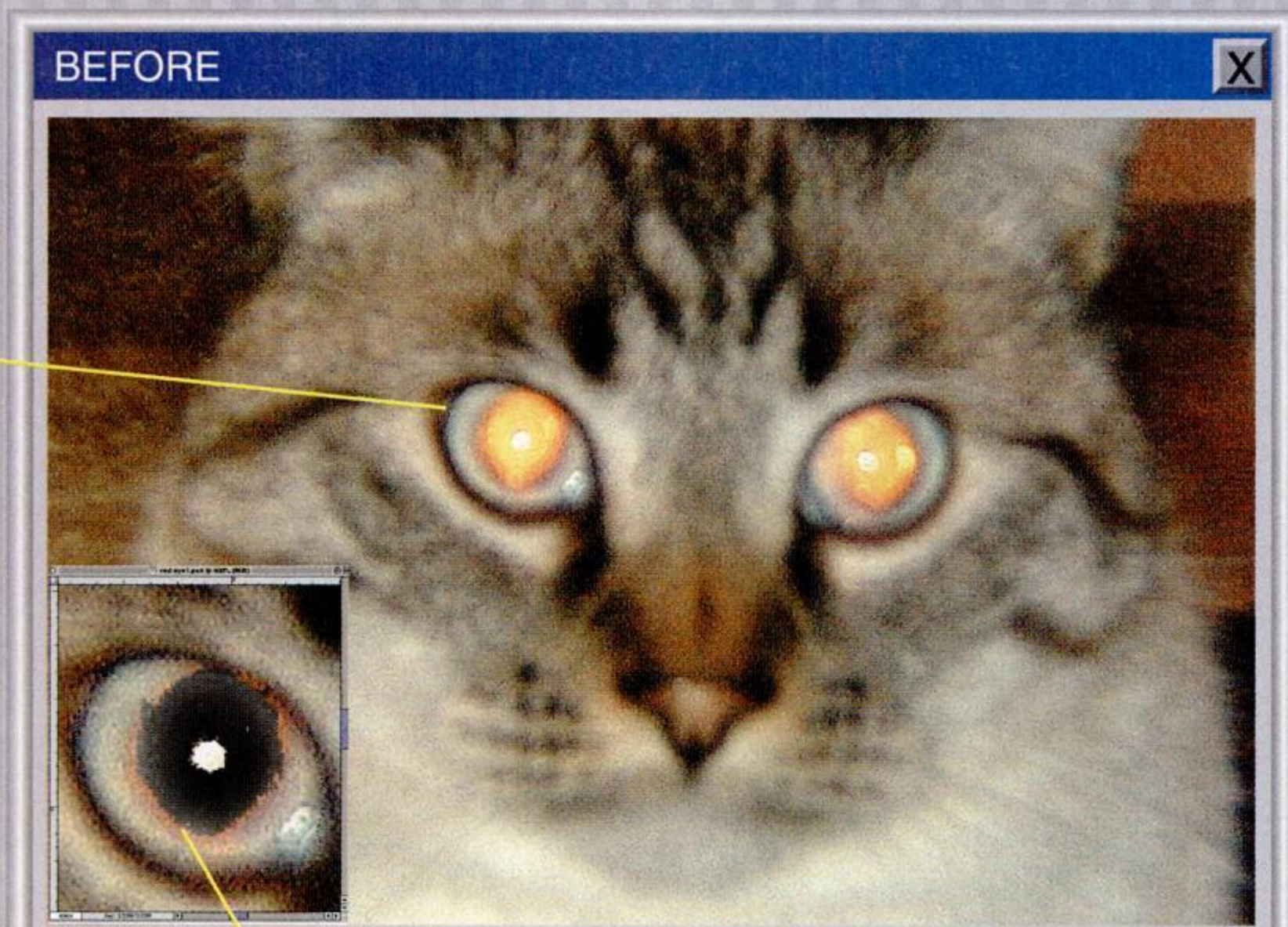
Red Eye

Red eye can turn the sweetest-looking baby or pet into a creature from Hell. It's caused by light reflecting back into the camera from the back of the eye. Fortunately, it's easy to fix.

Zoom in on the eyes and use the magic wand to select the red-colored parts of the pupil. (Remember to leave the small white circles in the middle of the eyes.) Press Control+Shift+U to desaturate the selection.



Select the airbrush tool and set it to 20 percent with a large, soft brush. Paint some black over the red section you've selected. It'll look like dark gray, but that's what you want. Deselect the pupil. Use the lasso to select the entire eye, and press Control+J to copy it to a new layer.

Go to the Image menus and select Adjust Hue/Saturation. Click the Colorize box, and move the sliders until the eye is the correct color. Lowering the saturation and raising the lightness will make it look more realistic. Finally, add a low percentage of Gaussian blur. Flatten the image, and you're done.

GET TO KNOW YOUR TOOLS

Regardless of which application you're using, your digital darkroom program will contain a litany of tools that correspond to those found in a regular film darkroom. Among those you'll use most often are:

Dodge tool: In a real darkroom, the dodge tool looks like a black lollipop and is used to keep light from hitting the photo paper, keeping that part of the image light. Dodging is also called "holding back." Use the dodge tool to lighten specific parts of a picture.

Burn tool: In a darkroom, the burn tool is essentially the photographer's hand, held in such a way that more light reaches a specific part of the image. "Burning in" darkens the part of the image to which it's applied.

Sponge tool: The sponge tool is used to saturate color in certain parts of the photo. In the darkroom, it's common to swab a print with a sponge full of fresh developer fluid if the image isn't vivid enough. Unlike a real sponge, the digital darkroom sponge tool can also be used to desaturate.

Magic wand: The magic wand is used to select a specific part of an image based on its color. If only the magic wand existed in a real darkroom...

Masking tools: These owe their existence to rubylith, a semi-transparent red film that paste-up artists and printers once used to mask parts of a page they didn't want to print. In a digital darkroom program, applying a mask to an area enables you to work on unmasked parts of the picture without changing what's under the mask.

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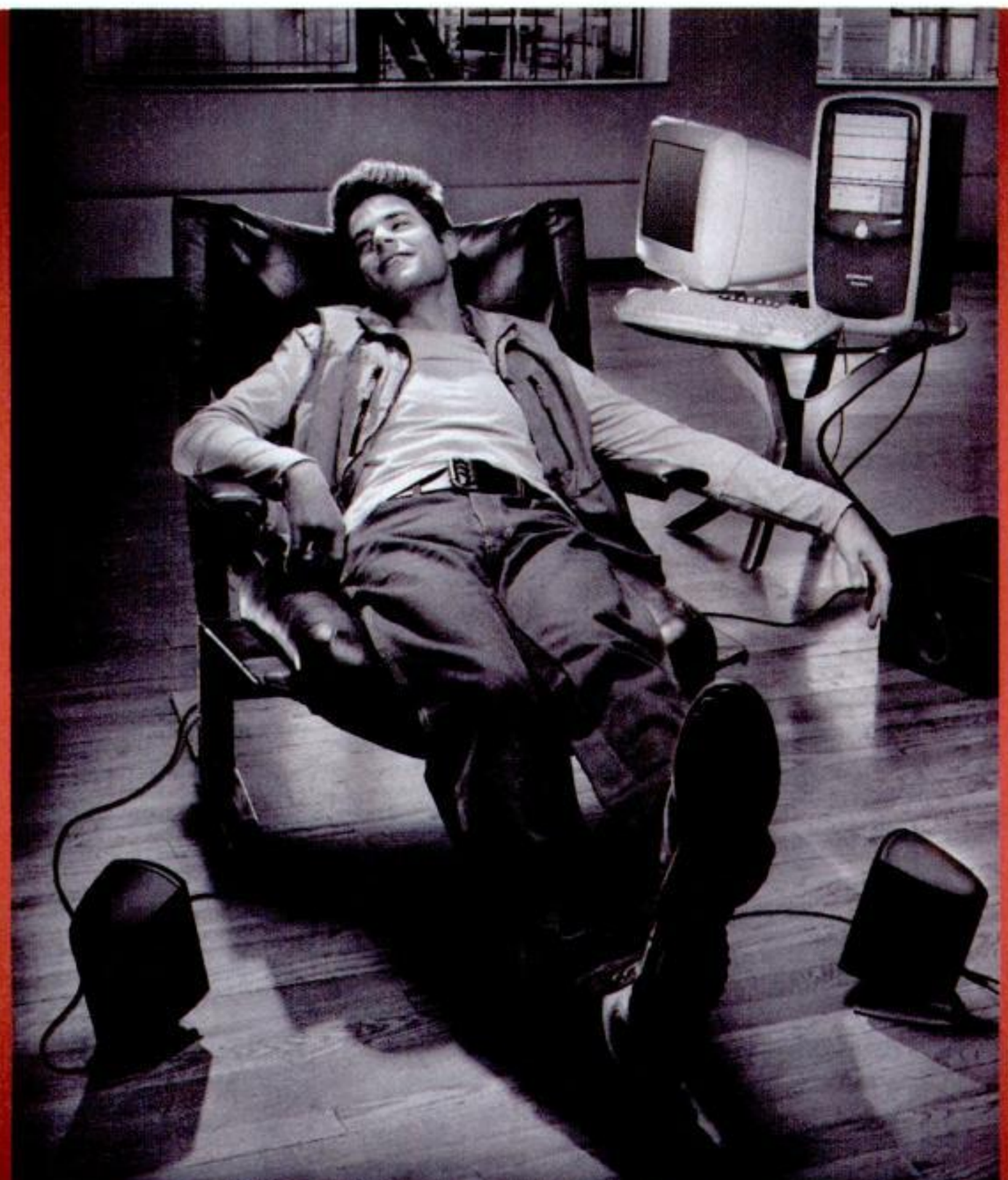

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MAXIMUM PC

THIS IS YOUR LIFE

Walk with us down memory lane as we honor the technologies that forever changed the PC industry. Our stroll through history starts in 1996 with boot, the magazine that defined the power-user experience and eventually became Maximum PC in 1998.

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Hello, hello! What's this? Neither the *Maximum PC* faithful nor *boot* diehards are likely to recognize the "Beauty or the Beast" issue at the top of this column. That's because this little gem was *boot's* "00" issue—a special one-shot that was distributed only to industry insiders. Sadly, the public at large will never get a chance to read Jon's very first Glitch...

1996

TRAILBLAZER OF THE YEAR

3dfx Voodoo 3D Graphics Accelerator

The year was 1996: PC games were gaining on their console cousins but still ran relatively slowly and offered crude graphics fraught with jaggies. Enter 3dfx's original Voodoo chipset. In one fell swoop, it delivered beautifully filtered textures and faster frame rates, elevating everyone's opinion of PC gaming.

With separate texture- and vertex-rendering units—each boasting 2MB of dedicated memory—the Voodoo showed the world that the most luscious 3D graphics could be found on the PC, not the console. At $300, the first Voodoo-based videocards were outlandishly expensive for the times. They also required a 2D graphics card to function. But no one cared. We all longed for the most sublime visuals in the gaming universe.

The first Voodoo cards offered then-unheard-of features such as texture-mapping, bilinear filtering, 16-bit rendering, and alpha-blending. Core clock speed was a spry 50MHz, resulting in a blistering fill rate of 350,000 polys per second. Offering resolutions of up to 640x480, the Voodoo turned the horribly pixelated "software" version of *Quake* into the wonderfully rendered *GLQuake,* replete with transparent water and mirror effects. And the collective jaw of the *boot* magazine staff dropped in amazement. The original Voodoo was the standard-bearer for every 3D accelerator that followed it, and defined the PC power experience more so than any product in this list.

Back when "3D cards" were first being invented...

...multiple vendors actually sold the same core chipset.

OTHER NOTABLES OF 1996

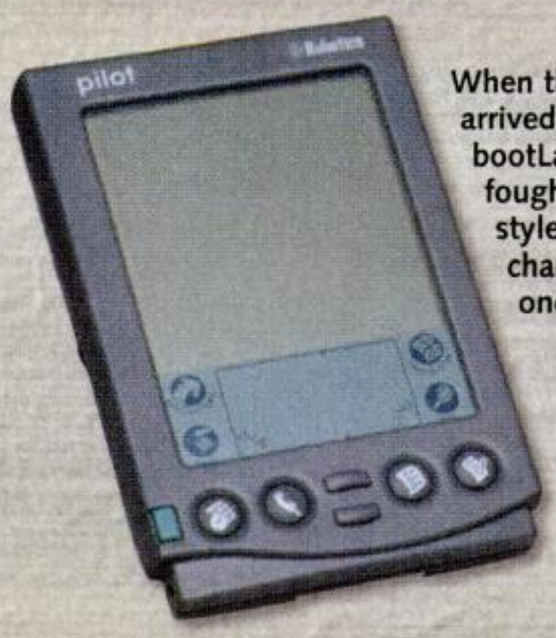
Windows 95
Thanks to Direct X, Win95 made PC gaming easily accessible to developers and consumers. It also marked the arrival of the Windows GUI that's been incorporated into every subsequent Microsoft OS.

U.S. Robotics Pilot
Though it boasted just 512K of memory, the original Palm device erased all the negative connotations associated with PDAs (see you in Hell, Newton) and set the standard for a new way of computing.

Quake
This first-person shooter from id offered incredible gameplay and an online multiplayer option—3D gaming has never been the same.

Kodak DC20
Kodak's first digital camera had just 1MB of internal storage, which was good for eight 493x373 images. But at $350, it ushered forth the era of affordable digital cameras.

Creative Labs AWE32
It was a righteous soundcard for both music and games and included the EMU8000 Advanced Wave effects music synthesizer chip. You could even add up to 28MB of external memory for storing MIDI samples. In 1996, this was *the* soundcard to have.



When the Pilot first arrived in the bootLab, editors fought gladiator-style for the chance to take one for a spin.

"When *we* were kids we used to shoot pics at 493x373 and download the images via telegraph and print them out on burlap potato sacks! And we LIKED it!"

Just as *Maximum PC* grew from *boot*, *boot* grew from another magazine—*CD-ROM Today*, which made its mark covering those "multimedia" discs that everyone bought but no one enjoyed.

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1997

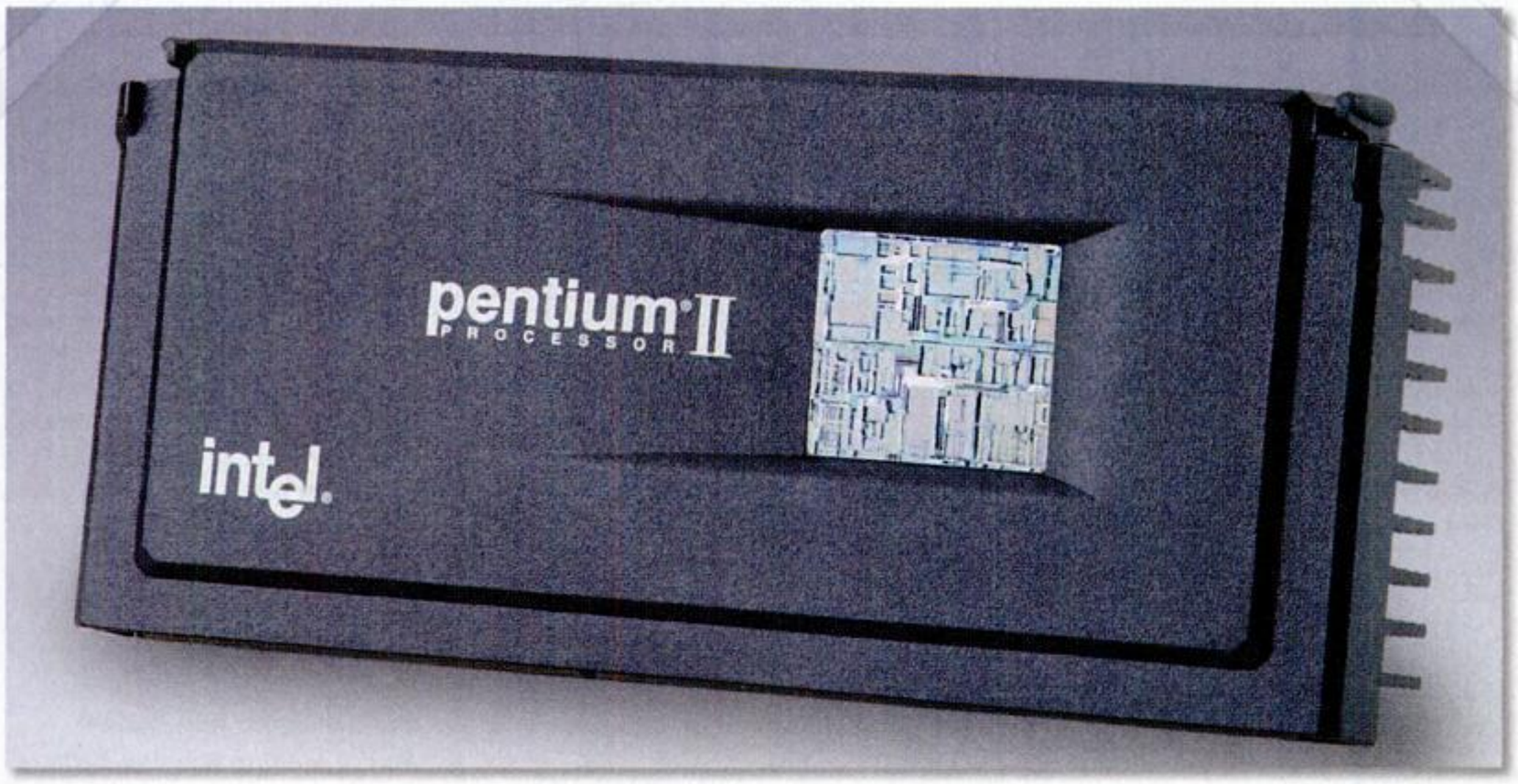
TRAILBLAZER OF THE YEAR

Pentium II

Ah, the Pentium II processor. We called our first encounter with it a "CPU seduction," and who could blame us? The P-II's closely-coupled L2 cache redefined how consumer CPUs would be engineered until the advent of the Celeron A. Its dual-bus architecture and 440LX chipset offered an awe-inspiring generational leap in performance. Its Single Edge Contact (SEC) design redefined motherboard interfaces for years to come. And the CPU's unbridled power and roster of features completely obliterated competition from AMD, Cyrix, and Winchip, resulting in "Pax Intel" for nearly four years. Care to run some 3D games? In 1997, you would only want to do so on a Pentium II.

The sleek, black CPU contained 7.5 million transistors, 32K of L1 cache, 512K of L2 cache, and 32-bit integer performance. It debuted at speeds of 233MHz and 266MHz, but was easily overclockable, earning it the reputation of "overclocker's dream" among *boot* magazine staffers.

The P-II (and its sequel, the P-III) cleared the field of competition for years and relegated competitors' products to the strictly poor-boy PC bin.



Desperately Seeking CPU: Single Black Processor seeks hot and bothered technophile for gratuitous Slot 1 filling. Must exceed 200MHz and enjoy long nights pumping pixels. MMX required. No smokers, please.

OTHER NOTABLES OF 1997

AGP

Intel's Accelerated Graphics Port smashed through the texture-transferring roadblock known as the PCI bus. AGP hustled data along at double the bus speed of PCI (66MHz vs. 33MHz) and featured a straight pipeline into system memory for "AGP texturing," allowing game developers to bump texture sizes from 32x32 to 256x256.

Hitachi 19-inch CRT

We first encountered this tube in Optiquest's V95 monitor. Within months, numerous display vendors would offer monitors with the same core CRT. This first generation of 19-inch displays granted consumers significantly larger screen sizes at an affordable price, bridging the vast gap between 17-inch and 21-inch displays.

Palm Pilot

The follow-up to USR's Pilot included most of the features we now take for granted: e-mail support, a backlight, HotSynching capabilities, and an optional modem.

4/12x Plexwriter

This SCSI CD-R sparked Plextor's dominance of all things CD-R. It cost $530 and was so fast it brought a "tear to the eye" of a *boot* technical editor. Since its appearance, Plextor has ruled the CD-R roost.

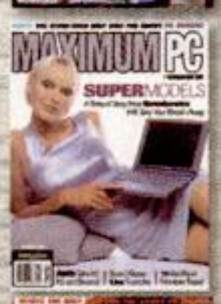
Microsoft Intellimouse

Who'd have thought that simply adding a scroll wheel to a mouse would forever change the face of web surfing, word processing, and weapon selection in gaming? Our original review of this little wonder deemed the wheel similar to "an appendix: It doesn't do any harm, but it's not good for much either." We stand corrected. We don't know what we'd do without the wheel now.

The invention of the wheel freed geek-kind from the shackles of on-screen scrolling.

When the first 19-inch CRT hit the scene, *boot* editors swore off smaller displays forever. Worried about desk space? Quit whining! Big is better—no ifs, ands, or butts.

The magazine saw the emergence of "Andrew-speak" in 1997. How Reviews Editor Andrew Sanchez came up with puns like "bright lights, big SCSI," we'll never know.



No August issue? Indeed, we took a month off to prepare for the segue to *Maximum PC*.

1998

TRAILBLAZER OF THE YEAR

Affordable CD Burners

At more than $1,000 a pop, the first CD-R drives (circa 1995) were beyond the average PC geek's financial grasp. But the 1998 appearance of $450 CD-RW drives ushered in an era of affordable, large-capacity storage. These babies burned CDs at only 2x, but suddenly gave regular-old consumers the ability to create "greatest hits" collections of their favorite software, as well as audio CD mix discs. In fact, next to game playing and porn viewing, CD burning played a major role in driving PC sales—and still does so today.

Ironically, *boot* magazine's first CD-RW drive review roundup—a showdown among drives from Hi-Val, Synchrome, Nomai, and HP—stated unequivocally: "CD-RW drives are not the wave of the future." We didn't like the slow read speeds, expensive CD-RW media, and lack of multi-read capabilities, so we continued to ally ourselves with CD-Rs. Today, we see the error of our ways. CD-RW has righted its wrongs, and vanilla CD-R drives are nowhere to be found.

But just how slow were the original affordable drives? A 2x drive required 40 minutes to burn a 650MB image and over an hour to packet-write 635MB of data on a rewritable disk.

2x? Cool your jets, buddy! You're moving *way* too fast!

OTHER NOTABLES OF 1998

Rio PMP300

When Diamond (later S3, and, later still, SonicBlue) launched the first personal hardware MP3 player, it flipped a big, fat middle finger at the Recording Industry Association of America (at least, as far as the RIAA was concerned). In spite of the RIAA's legal efforts to keep the Rio off the market, the device played a major role in the proliferation of MP3s by showing music lovers that they could take their tunes anywhere—without skips or poor sound quality.

K6-2 with 3DNow!

The K6-2 3D never made good on its promise to beat the pants off Intel's Pentium II, but the wily chip did essentially create the sub-$1,000 PC market.

Better than most Duran Duran tunes, dontcha think?

Unreal

The game was beautiful to behold and… well, it was unreal. Though *Unreal*'s heavy use of colored lighting and lens flare seems cheesy by today's standards, in 1998 the *Unreal* engine made Carmack's "brown, brown, and more brown" *Quake II* look almost passé.

100MHz system bus

After what seemed like an eternal walk through the 66MHz desert, we were finally delivered to the promised land of the 100MHz system bus. It ran on Intel's 440BX chipset, which included support for SDRAM, AGP, and ATA/33.

SoundBlaster Live!

The EMU10K1 processor of the original SBLive! card is still kicking in today's SBLive! cards—which shows just how revolutionary the chip was in 1998. The "O.G." Live! card not only allowed dual analog inputs and digital output (via a daughtercard), it also introduced EAX.

Voodoo2

The last competitive product from 3dfx, the Voodoo2 was also the first 3D chipset to virtually require a Pentium II-level processor. Lesser processors simply couldn't supply the Voodoo2 with enough polygons for the 3D accelerator to have a profound impact on frame rates.

A3D2

Aureal's wavetracing technology was technologically superior to Creative's reverb-based EAX API, and A3D 2.0 solidified this arrangement. It supported occlusion effects that enabled us to hear sound bouncing off the walls in games and was the best damn 3D positional audio API ever.

Riva TNT

The TNT chipset from nVidia was almost too good to be true: 32-bit rendering, 16MB of memory, 2D *and* 3D on the same chip, *and* as fast as a Voodoo2! Inconceivable! 3dfx is now out of business, and nVidia owns nearly the entire 3D videocard market. Call the TNT the first shot fired in that long, ugly battle.

Ah, yes, 1998—the year *Maximum PC* began hosting its infamous Hard Rock Cafe parties at the Las Vegas Comdex. Invitation only. The drinks are on us.

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1999

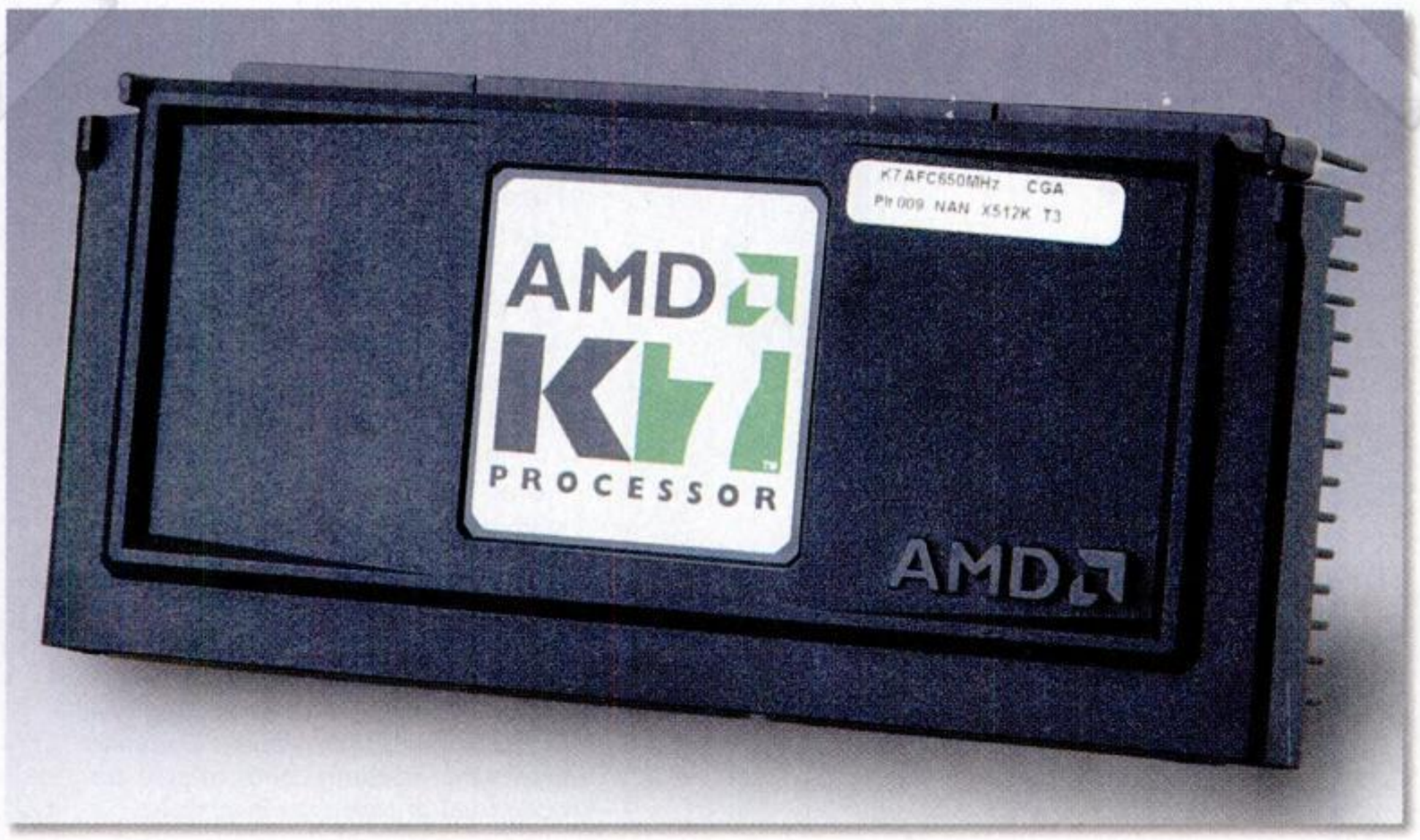
TRAILBLAZER OF THE YEAR

AMD Athlon

After eating Intel's dust for years, AMD needed to knock one out of the ballpark in order to survive. Solution: the "K7" Athlon. This one-of-a-kind CPU was more than a home run—it was a freaking grand slam. The Athlon's incredibly ambitious superpipelined architecture broke Intel's dominance in processors for the first time in PC history.

The Slot A CPU arrived with a 50MHz speed advantage over Intel's fastest silicon and immediately started kicking sand in Chipzilla's face. In every benchmark, the Athlon kicked the crap out of Intel's Katmai Pentium III processor and was heralded by *Maximum PC* as "the New Speed King."

The Athlon's dominance was easily explained by its internal circuitry. The chip featured three floating-point pipelines, while the Intel P-III featured just two. The Athlon could also execute a floating-point multiply instruction at twice the rate of Intel's finest. And the Athlon had a fat stash of L1 cache—128K, to be exact—while the P-III featured just 32K.



To you, it's probably the Athlon. To us, it will always be more fondly known as K7.

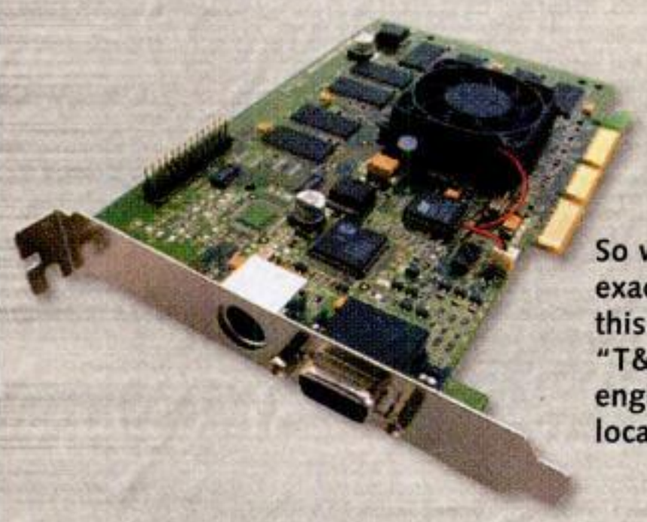
OTHER NOTABLES OF 1999

Pentium III Coppermine

Call it Intel's Comeback Kid—or just call it a damn fast CPU. The Coppermine core brought full-speed L2 cache to the P-III and allowed Intel to reclaim top-speed bragging rights.

GeForce 256

The original GeForce represented two things: the arrival of hardware transform and lighting, and the beginning of an nVidia dynasty. Although T&L is still somewhat of an empty promise, the GeForce line of 3D accelerators announced nVidia as the dominant player in 3D graphics.



So where exactly is this new "T&L" engine located?

Half-Life

The best single-player PC game of all time, *Half-Life* combined cutting-edge 3D graphics with an actual plot (gasp!) and never sacrificed a second of white-knuckle action. *Half-Life* became the new standard for gaming excellence and showed the entire industry how to make a PC game with almost unbearable tension.

Klipsch ProMedia V.2-400

With 400W of power, the Klipsch echoed through the PC audio market like a sonic boom. No speaker manufacturer has yet matched the ProMedia's combination of power, performance, and price.

We thought the Klipschies were fan-fraggin-tastic. The office clerks upstairs were decidedly less smitten.

Intel 820

This motherboard chipset is both famous and infamous—remarkable for its new frontside bus speed of 133MHz and questionable for its marriage to RDRAM. That choice of memory represented a major departure from run-of-the-mill SDRAM, but, at launch, a 128MB RIMM cost about as much as a used speedboat.

Broadband proliferation

1999 was the year broadband DSL and cable began entering American homes in earnest. If you were lucky enough to get it, you were an L.P.B. and the envy of all your friends. If you lived in a remote region where it wasn't available—well, it sucked to be you. More than any other hardware upgrade we've ever seen, broadband has opened up new realms of possibilities.

A "no recreational gaming before 6pm" policy was instituted in 1999. That was also the year we found out how easy it was to discover loopholes in the law.

2000

TRAILBLAZER OF THE YEAR

Napster

For most people, their "first time" was a revelation—their first time using *Napster*, that is. A user's maiden voyage typically triggered an internal conversation that went something like this: "Hmmm, it appears that all of the music in the world is now available for free over the Internet... HELL YEAH!" *Napster* became the fastest-growing software application in history, forever changing the face of the music industry by making digital tunes of all persuasions—including studio dubs and live bootlegs—completely free and available at all hours of the day.

Though *Napster* wasn't the only peer-to-peer file transfer application to hit our radar screens in 2000, it was certainly the most widely used. It also paved the way for services such as Gnutella, which learned from Napster Inc.'s troubles and avoided legal eagles by operating strictly from user to user without middleman servers connecting everybody together.

The days of free *Napster* are quickly coming to a close, but most of us will never forget the first time we made off with a free MP3. After all, you never forget your first time.

It's an owl, right? An owl wearing headphones... sure. Makes sense. Everyone knows that nocturnal birds of prey are quite fond of consumer electronics.

OTHER NOTABLES OF 2000

Burn Proof

Like penicillin, Burn Proof technology freed the masses from a nasty plague: buffer underruns during CD burning. No longer must CD-RW drive users cower in fear when recording a CD over the IDE interface. Burn Proof assures a perfect burn every time. Let freedom ring.

IBM 75GXP

This hard drive was the first ATA drive to make SCSI drives run for cover with their tails between their legs. With glass substrates and fifth-generation GMR heads, the 75GXP offered outstanding transfer rates. And the 75GB version was not only the baddest drive around, but also the biggest.

75 gigs!? Come again!? Our first drives held 20 megs!

GeForce 2 Ultra

With 3dfx reeling from the Voodoo5's uninspiring performance, nVidia dealt the final blow with the release of the GeForce2 Ultra. Packed with ultra-fast 230MHz DDR SDRAM, the GeForce2 Ultra rendered 3dfx's Voodoo6 board (scheduled for release sometime in 2001) irrelevant and put the final nail in 3dfx's proverbial coffin.

1GHz CPUs

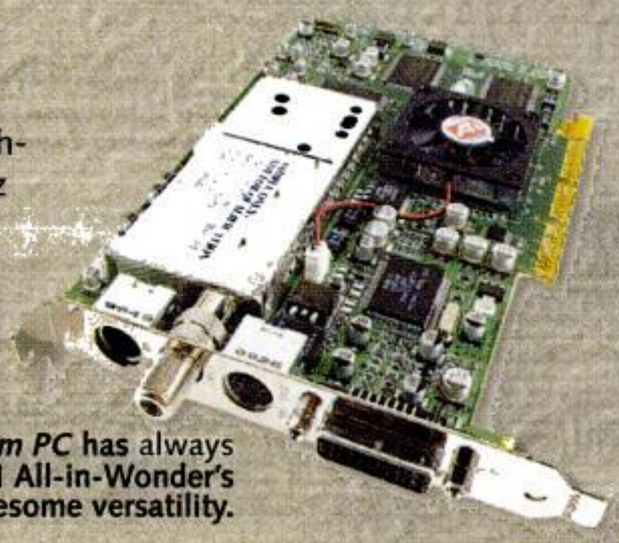
We never thought we'd see the day, but 1GHz CPUs arrived in quantity—well, for AMD, at least. Though they weren't as revolutionary in a practical sense as we thought they'd be, shattering the 1GHz barrier remains significant in terms of technological advancement. Next stop? 2GHz and beyond!

ATA Raid

"Double duty" was the catch phrase for IDE hard drives in 2000. Striping together drives such as IBM's 75GXP allowed for transfer rates formerly found only in the fastest SCSI drives.

ATI Radeon

As the only 3D accelerator that can hold a candle to the GeForce2, the Radeon represents a glimmer of hope that somewhere out there a challenger to nVidia exists. Give us Radeon Maxx next, please!



Maxim PC has always liked the ATI All-in-Wonder's awesome versatility.

And what exactly was supposed to have happened at the stroke of midnight? The Saint predicted the Y2K bug would be benign, and he was correct indeed.

PC-I8

PC-I8X

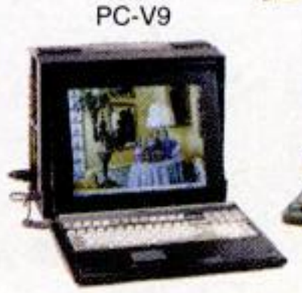
R08

PANEL PC

PC-V9M2

PC-V9M

PC-V9



PC-K

PC-KII

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ATT 230-600W

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ATT SIZE (8 3/8 x 6 x 5 7/8) SS SIZE (6x5 1/2x3 3/8)

Price	ATX	SS	AT/ATT
230W	35	35	43
250W	40	40	45
300/350W	55/80	55	65
400W	120	120	120
500W	N/A	N/A	230
600W	N/A	N/A	300

ACCESSORIES

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2ND FAN / BALL BEARING	$7/13
ALUMINUM HD COOLER W/ 2 BB FAN	$45
HD COOLER W/ 2 FAN BALL BEARING	$15
HD/FD MOUNTING KIT	$4/5
RSP IDE/SCSI W/ FAN	$25
RSM 146 SCSI WIDE METAL W/FAN	$85
TEAC 3.5" 1.44FD/BLACK	$15/23

(RSP/ FAN) $18 RSP68/FAN $48 IDE /SCSI

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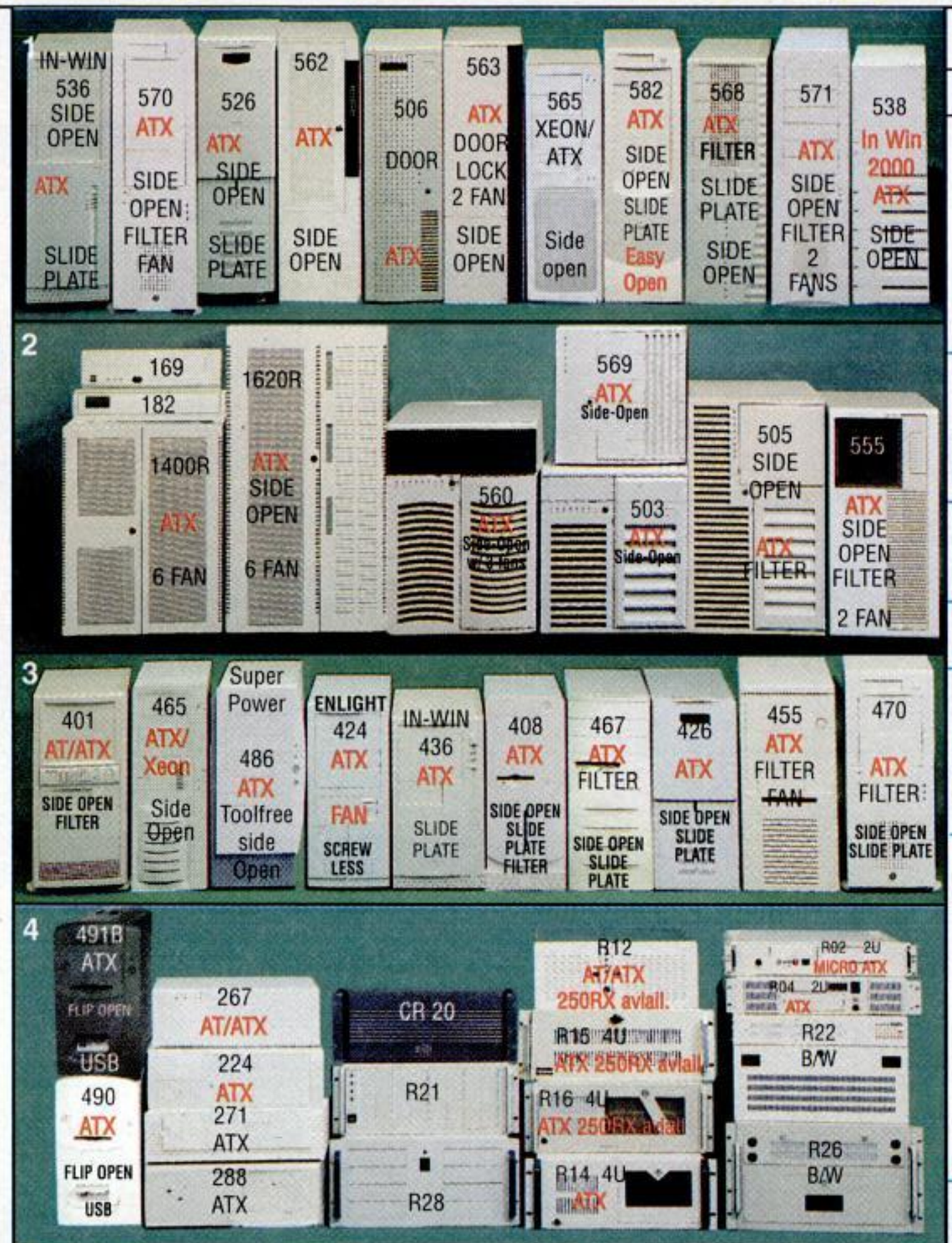

MODEL/ SPECS	Bare Bone	Dimension W.D.H	I/O ports	5.25"	3.5"	PCI	PCI ISA
103LPX socket 370	330	12.4x14.5x3.4	PS2 KB,mouse,VGA,USB,RJ45,2S,1P,AUDIO, GAME	1	1/1	2/1	or 1
104NLXBX slot 1	460	11.2x13.5x3.4	PS2 KB,mouse,VGA,USB,RJ45,2S,1P,AUDIO,GAME	w/FD & Slim CD		2/1	or 1
105LPX socket 370	375	11.9x12.6x3.4	PS2 KB,mouse,VGA,USB,RJ45,2S,1P,AUDIO,GAME, IR	1	1/1	2	0
106 socket 7	260	12.4x14.5x3.4	PS2 KB,mouse,VGA,USB,RJ45,2S,1P,AUDIO, GAME	1	1/1	2	or 0
108NLX socket 370	375	12.4x14.5x3.4	PS2 KB,mouse,VGA,USB,RJ45,2S,1P,AUDIO,GAME, IR	1	1/1	2	or 1
192 370/II Micro ATX	220	12.1x16.5x3.5	PS2 KB, mouse, VGA,2S,1P,AUDIO	1	1/1	2	& 0

Case Specification & Price List

Model	Price	Dimension W.D.H.	MB Size	5.25 Ext.	3.5 Int.	P.S.
R02 BARE	300	19x17.6x3.5	M.ATX	1/0	1/1	150W
R04B/W	290	19x24.3x3.5	ATX	1/0	1/3	250W
R08 B/W	1675/2300	19x22x3.5				
R12 B/W	305	19x19.7x7	B/ATX	4/0	1/0	250W
R14 B/W	230	19x21x7	B/ATX	3/0	1/3	300W
R15	325/550	19x24.4x7	ATX	6/0	2/2	300W
R16 B/W	240	19x18x7	B/ATX	3/0	1/2	250W
R20 B/W	290	19x20.5x7		8/0		300W
R21 B/W	290	19x18x7		8/0		300W
R22R/B/W	635/950	19x23.3x10.5	ATX	8/0	1/0	300W/R
R26R/B/W	630/850	19x22.6x10.7	ATX	4/0	2/4	300W/R
R28	290	19x17x8.7		8/0		300W
RSP	18	5.8x9.3x1.6			1	
RSM169	65/75	5.8x9.3x1.6			1	
001B	75	10x11.5x3		1/0		60W
001B1	65	8.3x10.6x2.8		1/0		50W
002B	88	6.9x14.6x5.8		2/0		60W
002B1	78	7.5x11.2x6.5		2/0		80W
004B	105	6.8x15.3x9.3		4/0		230W
004B1	100	7.5x17.3x10.2		4/0		200W
007B	180	7x15.8x13		7/0		250W
008B	280	8.4x20.2x18.3		8/0		300W
008B1	180	7.5x17.9x17.1		8/0		250W
103LPX	330	12.4x14.5x3.4	LPX	1/0	1/1	85W
104NLX	460	12.4x14.5x3.4	NLX	1/0	1/1	85W
105LPX	375	11.9x12.6x3	LPX	1/0	1/1	90W
106LPX-7	260	12.4x14.5x3.4	LPX	1/0	1/1	85W
108NLX bare	375	11x13.6x3.4	NLX	1/0	1/1	135W
192M.ATX	85	13.1x16.5x3.5	M.ATX	1/0	1/1	150W
224	75	17.4x18.8x6.1	ATX	3/0	2/2	230W
267	75	16.8x16.8x6.2	ATX	2/0	2/1	250W
271	90	17.3x15.9x5.5	ATX	2/0	1/1	250XB
288	75	16.9x17x6	ATX	3/0	2/1	230W
325B	75	8x18.5x17	ATX	3/0	2/1	235W
327	72	7.5x16.5x17.3	ATX	3/0	2/2	230W
337	88	7.8x18.8x16.5	ATX	3/0	2/2	300W
338	55	7x14.7x13.8	M. ATX	2/0	2/1	145W
366	50	7.2x15.5x14.3	M. ATX	2/0	1/1	235W
367	55	7.7x16.5x17	ATX	3/0	2/1	235W
370	89	8.3x17.3x16.1	ATX	3/0	2/2	250WB
392	80	7.5x17x17	ATX	3/0	2/2	250W
393	95	9x17.5x17.5	ATX	6/0	1/1	250W
396	55	8.3x17x15.5	ATX	3/0	1/3	230W
401	110	8.5x17.3x18	ATX	2/0	2/2	250W
408	80	8.2x19.8x18.4	ATX	3/0	1/5	250W
411	67	7.2x17.2x16.8	ATX	4/0	2/1	250W
412	67	7.2x17.2x16.8	ATX	4/0	1/2	250W
413S/BL	67	8.5x19.5x18	ATX	4/0	2/1	250W
414P	67	7.2x20x16.8	ATX	4/0	2/1	250W
422	70	7.7x16.6x18.1	AT	4/0	1/4	250W
424	70	7.5x18.9x16.7	ATX	4/0	2/1	250W
426B/W/S	80	7.5x17.5x19.3	ATX	3/0	2/2	250W
436	70/85	8.6x18x15.6	ATX	3/0	2/2	250/300W
455	110	8.5x17.5x18.6	ATX	4/0	2/3	250W
465	195	9.3x17x17.2	XEON/ATX	2/0	2/2	300W
467	85/100	7.5x16.7x18.8	ATX	3/0	2/4	250W/300W
470	110	8.3x17.3x21.3	ATX	4/1	1/2	250WB
472	60	7.5x18x17.6	ATX	4/0	2/2	250W
482B	80	7.8x19.8x17.5	ATX	4/0	2/2	250W
486	67	9.6x19.5x17	ATX	4/0	2/1	250W
489**	85	7.3x17x17	ATX	3/0	1/2	235W
490	70	8.5x15.5x15	ATX	2/0	2/2	250W
491B	70	8.5x15.5x15	ATX	2/0	2/2	250W
496	60	8.25x17.8x16.5	ATX	4/0	1/3	250W
501	185	8.25x17.2x23.8	ATX	4/0	2/4	300W
503R/B	455	14.8x20.4x18.4	ATX	8/0	2/4	300RW
503/B	305	14.8x20.4x18.4	ATX	8/0	2/4	300W
505	555	14.6x23x26.8	ATX	12/0	1/8	300W
505R	705	14.6x23x26.8	ATX	12/0	1/8	300RW
506/R	155/370	7.8x16.5x24.4	ATX	6/0	2/2	300W/R
524	380	13.9x25.6x19.1	ATX	7/0	1/2	300RW
526B/W	105/120	7.5x17.5x24.5	ATX	6/0	1/4	250W/300W
528	95/110	7.5x16.5x24.8	ATX	6/0	1/5	250W/300W
536	93/108	7.8x17x24	ATX	5/0	1/5	250W/300W
538	290	8x20.5x24.5	ATX	5/0	1/6	300RW
555/B/R	440/680	11x19.3x23.6	F	4/8	0/0	400W/300R
555/R	440/700	11x19.3x23.6	ATX	4/8	0/0	300W/300R
560/R	290/445	15x24.5x23.5	ATX	11/0	2/4	300W/300R
562/R/B/W	250/470	8.7x17.9x26.8	ATX	9/1	1/0	300W/300R
563/RB/W	145/370	8.7x17.9x26.8	ATX	10/0		300W/300R
565	195	9.25x18.3x21.2	XEON/ATX	4/0	2/4	300W
568	105/120	7.5x17x22.8	ATX	5/0	2/4	250W/300W
569B/W	225	13.5x17.8x14	B/ATX	6/2	0/8	300W/300W
570/R	150/370	8.3x17.3x26.4	ATX	7/1	1/2	300W/300R
571/R	160/370	8.3x17.3x26.4	ATX	6/1	1/2	300W/300R
582	105/120	7.8x16.5x23.2	ATX	6/0	2/1	250W/300W
588	105/120	7.8x16.5x23.3	ATX	5/0	1/3	250W/300W
1400/R	715	16x20x24	F/ATX	14/0		300R
1620/R	950	16.5x20.3x34.3	F/ATXx2	16/0		300R

*Case Color: Blue, Purple, Green, Orange, Red.
**Case Color: Blue, Purple, Green, Red, Black.

Model# Starts with:
1 for Slim Case
2 for Desktop Case
3 for Mini-Mid Case
4 for Mid Case
5 for Full/File Server Case
Side Open: Side Panel can be removed independently
Slide Door: Sliding front door up and down
Slide MB Plate: Motherboard tray ca slide in and out form rear

MB SIZE = MOTHERBOARD SIZE • F= FULL SIZE • B= BABY SIZE
X=ATX • M. ATX= Micro ATX
R= REDUNDANT POWER SUPPLY WITH HARDSWAP
250XB= Ball Bearing

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HOW TO PREPARE FOR YOUR NEW PENTIUM 4 SYSTEM

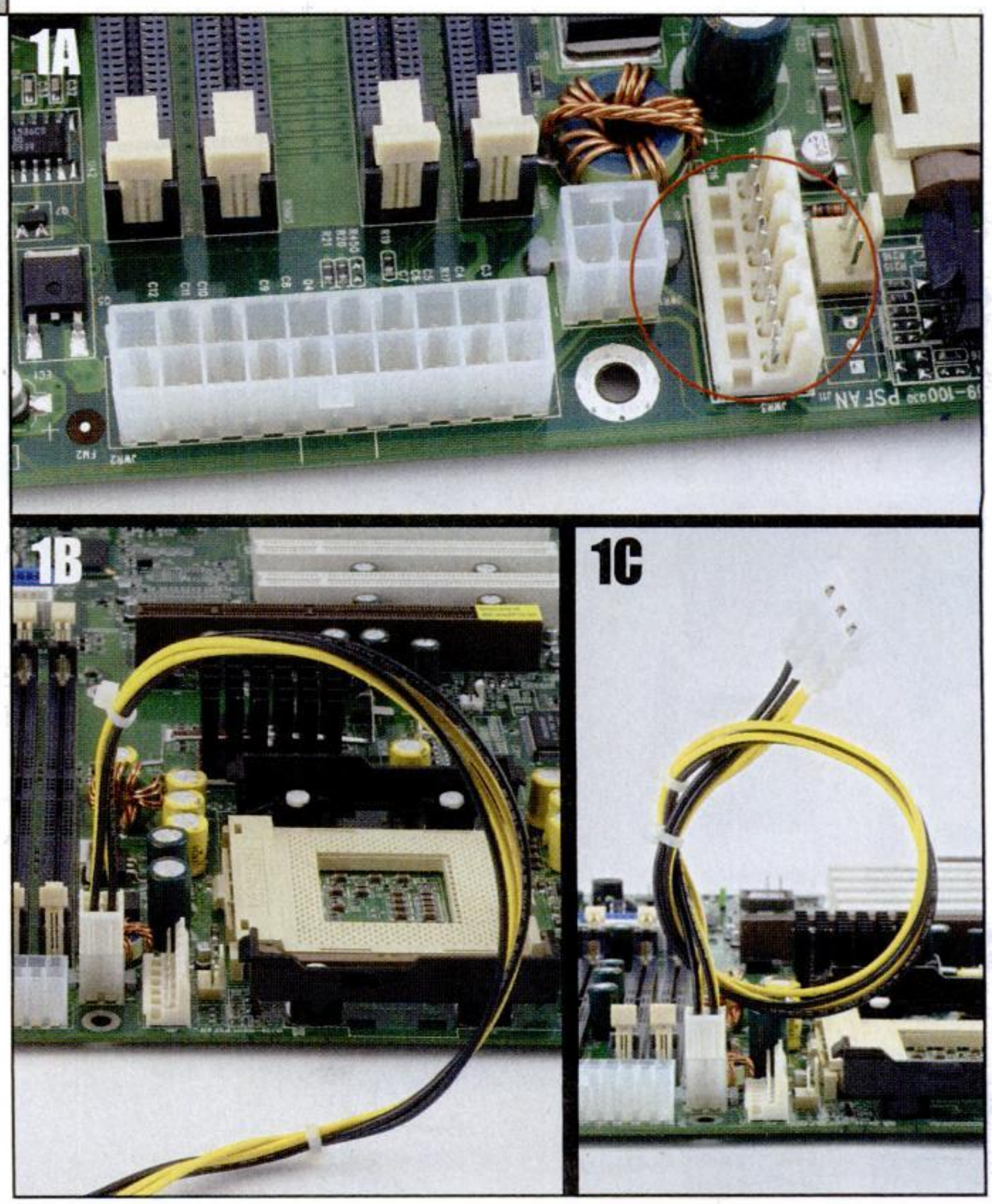
Building your own P4 rig? You'll need to consider six design issues before you get started.

You may be an experienced PC builder with myriad systems under your belt, but if you've been thinking about rolling your own Pentium 4 system, you'll want to sit down and read this first. Intel's first new processor architecture in five years is a little different from past offerings. In addition to requiring new case designs, cooling strategies, and memory, the P4 demands certain videocard compatibility and power supply considerations. Overlook just one of these seemingly minor details and you may have a 100-pound paperweight on your hands. So sit down, smoke a stogie, and find out what it takes to make your Pentium 4 rig healthy and happy.

—Scott Tarr and Gordon Mah Ung

1 POWER SUPPLY

With the Pentium 4, Intel has laid the groundwork for multi-gigahertz machines. To feed those power-hungry monsters, Intel added additional power lines for 12-volt and 3.3-volt lines to motherboards. Most new power supplies have the 5- and 3.3-volt auxiliary power connectors that look like the old-style AT connector, but lack the square ATX12V connector that Pentium 4 systems require. If your existing power supply already has the auxiliary cable that would fit into the connector pictured in 1A, but lacks the ATX 12-volt cable pictured in 1B, fear not. PC Power and Cooling sells a converter cable (1C) that draws off the 12-volt lines of a drive connector. But be sure your power supply can ante up enough juice. PC Power and Cooling recommends that your power supply be rated for at least 350 watts if you want to use the converter with it.



LESSON The P4's "enhanced" power requirements necessitate either a new, P4-compatible power supply or an older supply with a special converter.

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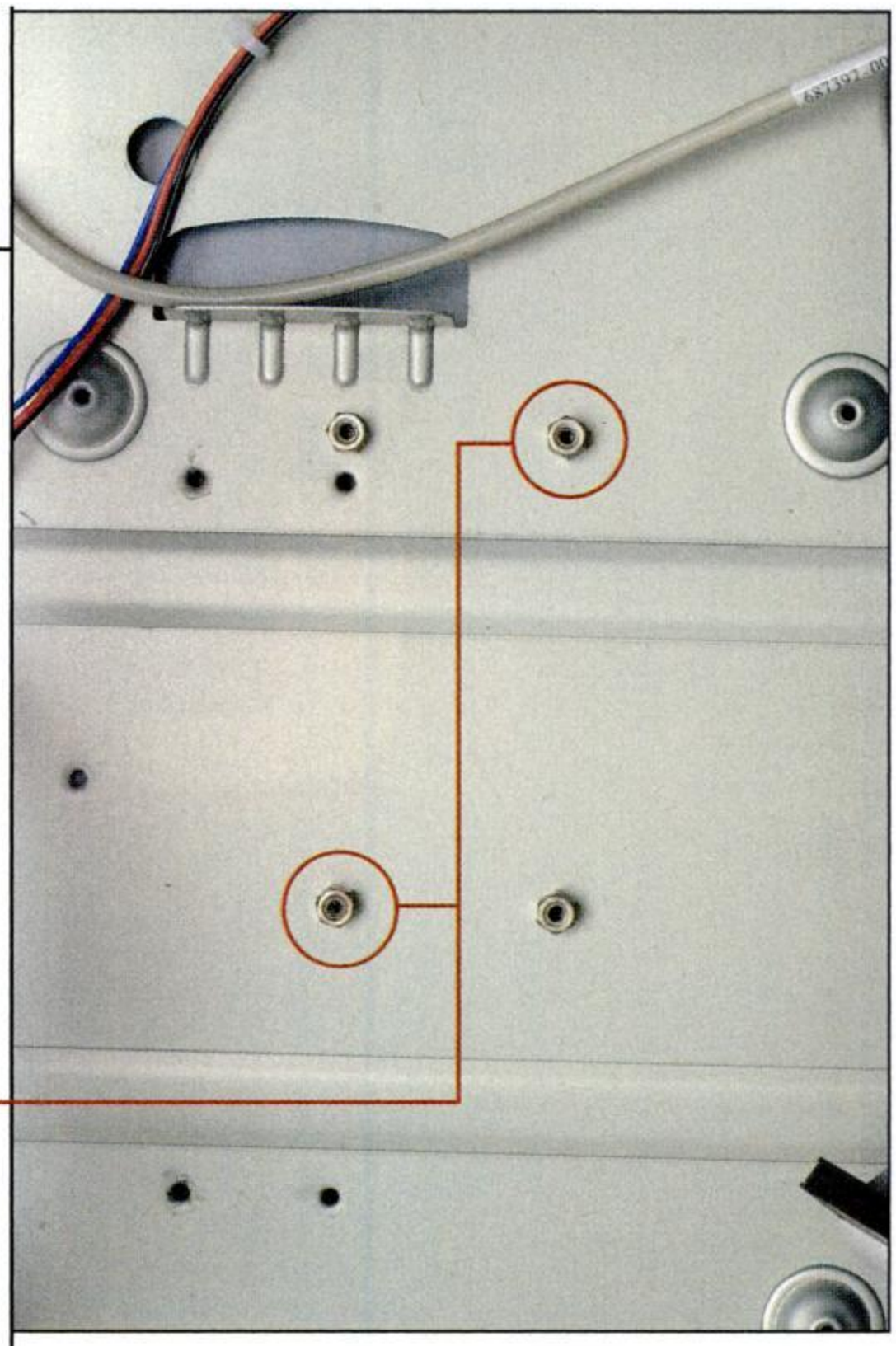
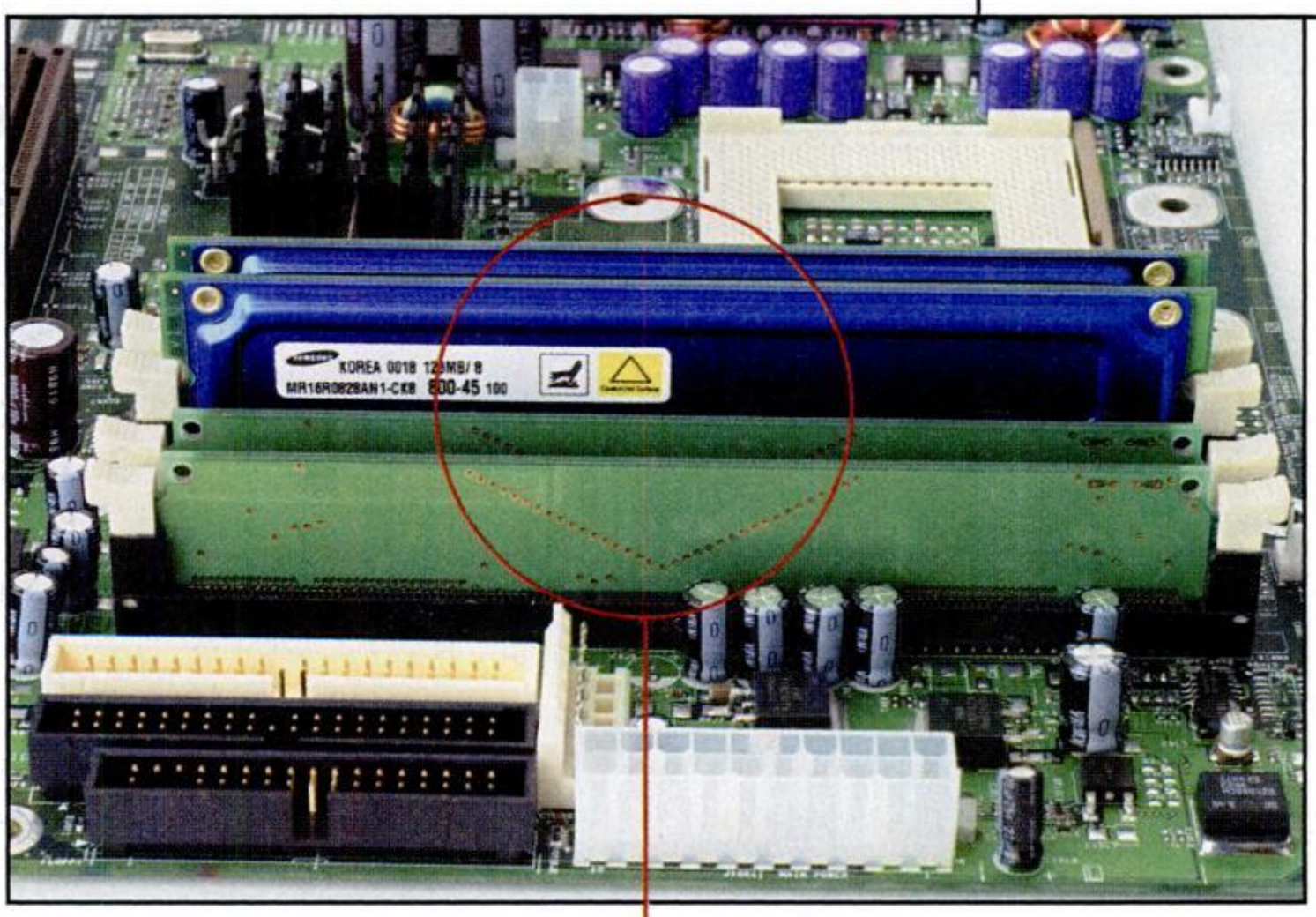
2 HEATSINK MOUNTS

The Pentium 4's massive power consumption translates into increased heat. To dissipate the excess heat, Intel is pushing larger, copper-based heatsinks. Because copper is heavier than the aluminum used in traditional heatsinks, Intel recommends bolting the heatsink to the case itself. This keeps that heatsink from tugging on the proc—and bending the mobo—or falling off, leaving the Pentium 4 to burn to a crisp. Some motherboard vendors help the customer avoid buying a new case by including a backing plate that supports the extra weight.



LESSON **This case, expressly built for P4 systems, is ready-made for direct heatsink mounting—no backing plate is necessary.**



LESSON **The P4's memory slots are kind of like Noah's Ark: In order to do any good, all inhabitants must come in pairs.**

3 RDRAM

While the Pentium III was only able to use 1.13GB/sec of RDRAM's 1.6GB/sec memory throughput, the Pentium 4 skips single-channel configs and takes full advantage of dual-channel, 3.2GB/sec lovin'. Unfortunately, dual channel means that your RIMMs must come in pairs. In order for your P4 rig to boot, all empty RIMM slots must be filled with terminators, also known as C-RIMMs. Mismatching RIMMs and C-RIMMs will keep your system from booting, too. Be sure to check your motherboard manual for proper placement of RIMMs and terminators, and you'll be OK.

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SONIC LINK™

Your computer may be the most powerful audio component in your home– allowing you to download MP3s from the internet, create playlists, burn songs from your CDs and much more. Now you can make use of all that power with **Sonic Link** from Turtle Beach.

By using easy-to-install wireless transmitters, Sonic Link allows you to play MP3s stored on a computer in one room, through your home audio system in another room! And that's just the beginning. With the included AudioStation 4 software, you can create songlists by genre, style, artist, etc, to keep the music going all night long!

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Bring the power of the internet to your home audio system!

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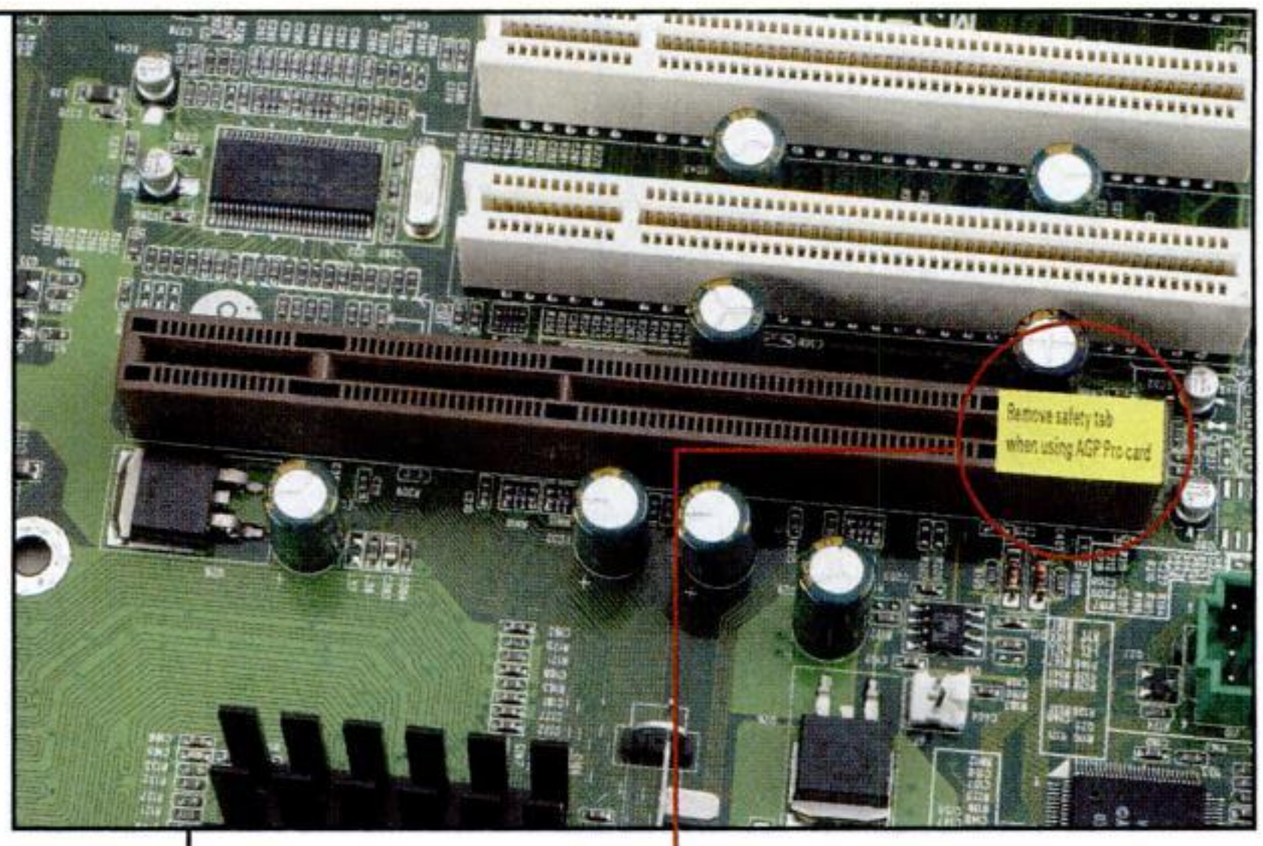
4 AGP PRO SLOT

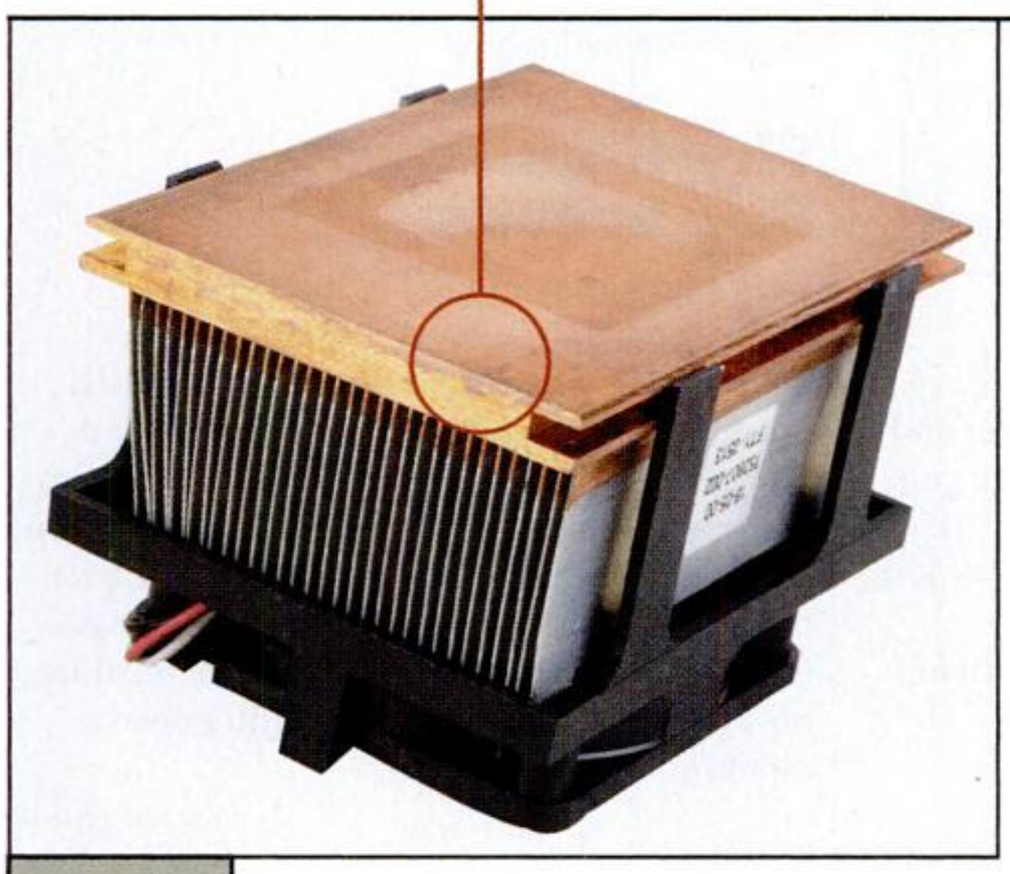
Now that the industry's transition from 3.3-volt to 1.5-volt AGP cards is over, Intel says it's safe to design motherboards that support only 1.5-volt videocards. Unfortunately, no one informed 3dfx about this. Voodoo3, Voodoo4, and Voodoo5 graphics cards won't physically fit into Pentium 4-based motherboards. The 3dfx products will only function in 3.3-volt mobos. The good news is no other vendors seem to be affected.

The P4 mobos also sport the new AGP Pro slots. Designed to provide more juice to power-hungry AGP cards, these slots only matter if you purchased the Pro version of your card.



LESSON You shouldn't pull the yellow safety tab from the AGP Pro slot unless you have an AGP Pro card. If you do pull the tab, you'll end up buying a Pro videocard whether you wanted one or not.

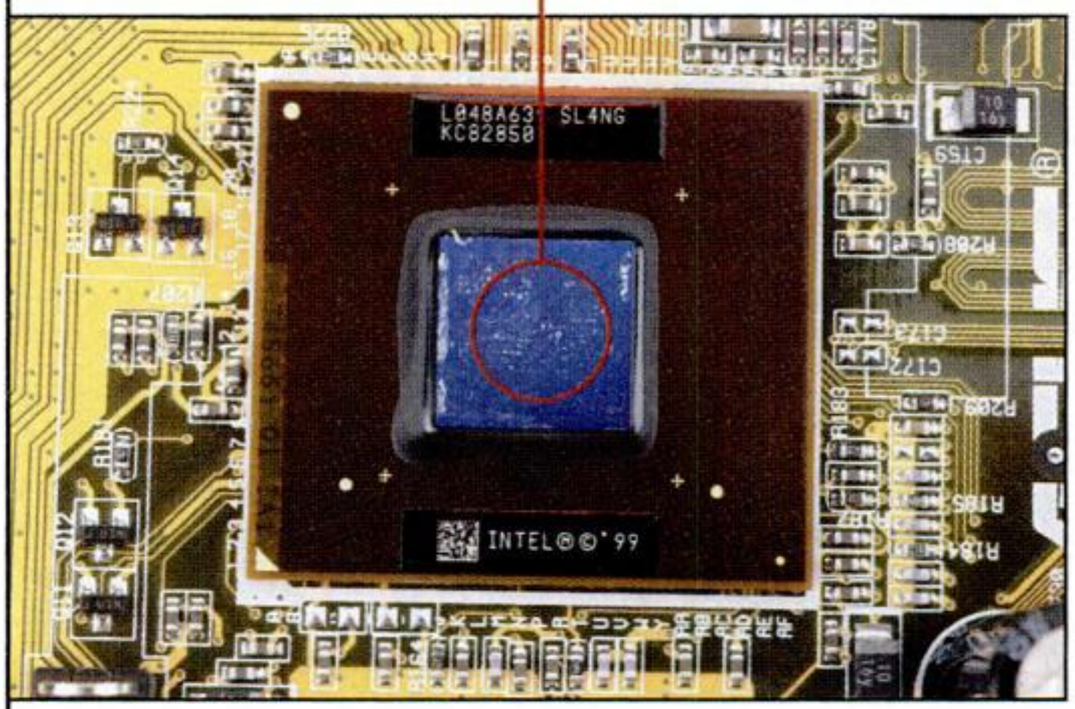
LESSON It's hot! Damn hot! Even the mightiest of Pentium III and Athlon heatsinks can't stand up to the sizzling capabilities of the Pentium 4.



5 HEATSINK

This specimen is fairly representative of the new copper-based P4 heatsinks. Notice the different colors of the metal. The silvery color identifies the aluminum-based heatsink fins. The copper color is...well, copper. Intel has worked with heatsink makers to ensure that the copper/aluminum mixture process is consistent and uniform. Why use copper? Because Cu is a better conductor of heat than Al, and it's able to transfer heat from the P4 to the aluminum fins more efficiently than an old-school all-aluminum heatsink.

LESSON Keep that chipset cool, kids. Don't drape cables on top of it, and don't restrict airflow around it.



6 CHIPSET WITH HEATSINK

In days past, anything more than feeble passive cooling on a core-logic chipset was considered overkill. But the massive heatsink on the 850 chipset dwarfs the pissant heatsinks we saw on the BX and 820 chipsets. For 850-based systems, passive cooling is the *minimum* requirement. What's the diff? Intel's 850 chipset is nearly as complex as the original Pentium III (6 million transistors vs. 9.5 million transistors) and is actually a flip-chip design that inverts the core to get it closer to the heatsink. ✹

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ASK THE DOC

Symptom | Diagnosis | Cure

Even the burliest of PCs comes down with a bug every now and then. That's when you need to call The Doctor and get a diagnosis that'll have you up and running in no time. Send your symptoms to: **doctor@maximumpc.com**

Creating Your Own Start-Up Logo

I was wondering if you could tell me how to add a special personal logo to the System Properties window. I've seen them before: Dell systems say "Made by Dell" and HP computers have the HP logo. Well, I built my computer and I would like it to say, "Hey! I built this." Can you offer some customizing advice?

— Brad

You can create your own system logo and look like a true geek-god.

There are two steps to changing your System Properties box appearance—the first step involves changing the text; the second step involves replacing the logo. First, you need to replace the text by creating a file called OEMINFO.INI and placing it in your C:\Windows\System directory. Open OEMINFO.INI in Notepad. Here's a sample of the text to be added:

```
[General]
Manufacturer=Maximum PC
Model=Micron 733MHz

[Support Information]
Line1=""
Line2="The Maximum PC Test
Machine"
Line3=""
Line4="Maximum PC"
Line5="150 North Hill Drive"
Line6="Brisbane, CA 94005"
Line7=""
Line8="415.468.4684"
Line9=""
Line11="doctor@maximumpc.com"
```

Modify your text as you see fit. After you've done so, save the OEMINFO.INI file. Now pick or create the art you'd like to use for your System Properties window.

Open the image file in the image app of your choice (we used *Photoshop*). You'll have to set the background as transparent and scale the image to no larger than 180 pixels wide and 114 pixels high. Save the file as OEMLOGO.BMP and place it in your C:\Windows\System directory. Windows NT and 2000 users need to save both the OEMINFO.INI and OEMLOGO.BMP files in their C:\WinNT\System32 directory.

Now admire your handiwork by checking your System Properties box!

Sky-High AGP Bus Speeds

I just purchased an Intel 800MHz P-III EB proc, installed it in my Abit BE6-II motherboard, and set the frontside bus to 133MHz. The system is running almost perfectly, but every once in a while Windows 98 will lock up halfway through startup. When I reset the computer and go into Safe Mode and reboot once more, everything is fine. My concern is that with the AGP bus set at 2/3, I may be pushing my Voodoo 5500 too hard. If so, do I need a different motherboard?

—Warren Hunter

> **"Some cards can take this punishment. Others can't—so problems arise."**

Yes, Warren, your problem can be traced to the motherboard—specifically the 440BX chipset on the board. Since the 440BX officially only supports frontside bus speeds of 100MHz, anything above 100MHz pushes the other mobo-bound busses past their intended limits.

The PCI bus is supposed to run at 33MHz, the AGP bus at 66MHz. Using your clock generator (the option that lets you run the AGP at 2/3), you're pushing your AGP card at 88MHz. That's 22MHz more than the AGP spec allows for. Some cards can take this punishment. Others can't—so problems arise. Intel's newer chipsets (such as the 815 and 820) nullify this problem, as each of them have official FSB

This month:

- Creating Your Own Start-Up Logo
- Sky-High AGP Bus Speeds
- Bad Battery Backup?
- Throwing Out That Onboard Sound

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www.maximumpcmag.com

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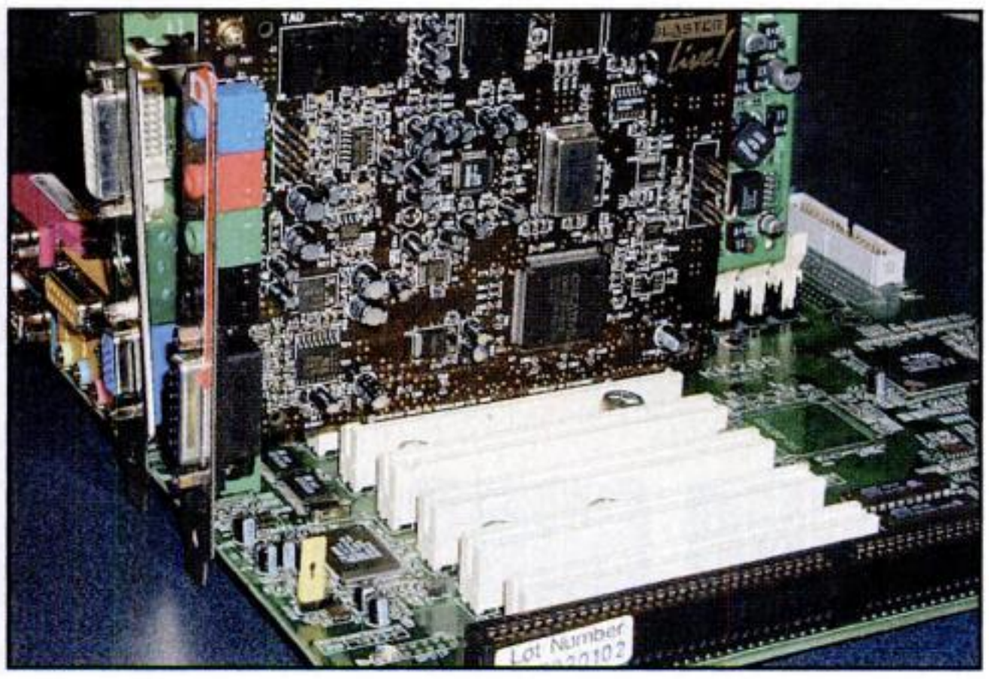

Since onboard sound eats up CPU cycles, throw it out and install a real soundcard.

speeds up to 133MHz.

So, in order to alleviate what ails ye, you'll have to buy a new motherboard with either the 815 or 820 chipset on it. If you want to stay away from RDRAM, go with the 815 chipset. That puppy overclocks very well.

Bad Battery Backup?

I have an uninterruptible power supply (UPS) that's more than seven years old, and I'm looking for a new one because of safety concerns. How long is too long to keep a UPS? Given the fact that it's basically a battery, is there a chance that it can leak acid or generate a risk of fire?

—Larry

The Doctor contacted APC to learn the exact lifespan of UPSes. APC says that typical battery life is between three and five years. In areas where there are frequent power outages—such as California in the past few months—a battery won't last that long, because of the extra stress placed on the battery as it kicks in to power your system.

The better-designed UPSes have user-replaceable batteries. So, after three to five years, it's best to just replace the battery. If you've got a UPS that doesn't have a replaceable battery, you're just going to have to scrap the device—but please consider the environment. A UPS is a battery with electronics attached it, so don't just trash it. You don't need battery acid splashed all over your dumpster. To alleviate end-user trash issues, APC has a program that allows UPS owners of any brand to trade in their old UPSes for a discount on new ones (from APC, natch).

> **"If you've got a UPS that doesn't have a replaceable battery, you're just going to have to scrap the device."**

second opinions

READERS SHARE THEIR HOME REMEDIES

Heat Pipe Confusion

"How to Build a Heat Pipe" (Lab Notes, Jan 01) confuses me. Is there something in the condenser or evaporator to control the flow of coolant? I understand that hot coolant will rise—ideally through one tube—and be cooled at the condenser. Then, having been cooled by the condenser, it will fall through the other tube and continue in this manner. Wouldn't the condenser function better if placed on edge, so hot coolant would flow to the top, be cooled, then fall to the bottom on its return to the evaporator? This would also make it easier to fill, since your valve is below the top coolant level of the condenser.

Also, I realize that copper tubing has some inherent cooling ability, but wouldn't the system be easier to construct if plastic or rubber tubing were used? The basic idea of the heat pipe is indeed efficient and effective. Wouldn't it be possible (and better) to place an aftermarket water pump somewhere in the heat pipe? Granted, the addition of a small electric pump would not be nearly as elegant, but it would enhance reliability.

—Phil Van Camp

If you think about the coolant and the piping in terms of a circular cycle, you're missing the point. In fact, the heat pipe can work with just one tube capped off, with all of the coolant flowing inside that one tube.

In the article, our heat pipe functions as follows: The coolant heats up at the evaporator and then rises (in both tubes) toward the condenser, where it's cooled off. At that point, the coolant then drops back down (in both tubes) toward the evaporator, where the cycle starts anew.

My guess is that you think the heat pipe needs to be in an upright position when it's being filled. But, in fact, it's necessary to remove the heat pipe, lay it on its side, and then fill it. A small amount of air in the heat pipe won't ruin its ability to operate correctly.

Yes, rubber hoses would work. But if you're familiar with car radiators, you already know that rubber hoses can burst at the most inopportune times. We weren't about to risk the possibility of water spraying around the inside of my case, so we used copper tubing. It's cheap and more reliable (depending on your soldering skills). Besides, we wanted to solder things together.

Throwing Out That Onboard Sound

I have a Compaq 5360 computer. It has an AMD 450MHz K6-2 with 64MB RAM, a 20GB hard drive, and Win 98 SE. What I want to know is how to disable the ESSolo-1 onboard sound and use a different PCI soundcard. Can you help me?

—David Wayne Altoft

Before starting, jot down the information pertaining to the onboard sound chip (i.e., IRQ and DMA numbers). You may need these later. The easiest way to disable onboard sound is to boot up and enter your BIOS. Because BIOSes differ from PC to PC, you may need to dig a little for the correct BIOS screen, but you can generally find the onboard sound under either "Chipset Features," "PNP/PCI Configuration," or "Integrated Peripherals." If necessary, read your motherboard manual to determine where your onboard sound is located in the BIOS. Find it and disable it. Now reboot, go to your Device Manager, and make sure your onboard sound isn't anywhere in sight. If it is, select it and remove it. Now, install your soundcard—with the appropriate drivers, of course—and you're all set to go.

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REVIEWS

Riding into the sunset

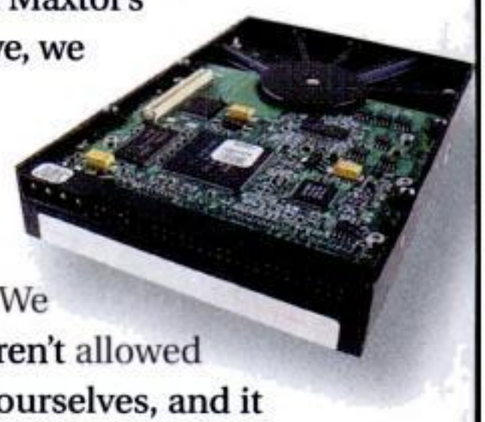
It's been a long, fun-filled ride for me here at *Maximum PC*, but the time has come for me to switch gears and move along. By the time you read this, I'll have traded in my anti-static wrist strap for a set of full leathers, a helmet, and boots, and will be working for *Motorcyclist* magazine as an associate editor.

I won't bore you with the typical "I remember when I first came to *Maximum PC* magazine..." drivel, but, suffice to say, my tenure at the magazine has been an incredible experience that I'll never forget. Over the past two years we've laughed, cried, overclocked, and fried a hell of a lot of hardware.

But enough about me. *Maximum PC* will continue to kick ass and deliver the goods for a long time to come, and I've already signed up for a subscription (I just hope my magazine isn't late).

—JOSH NOREM, REVIEWS EDITOR

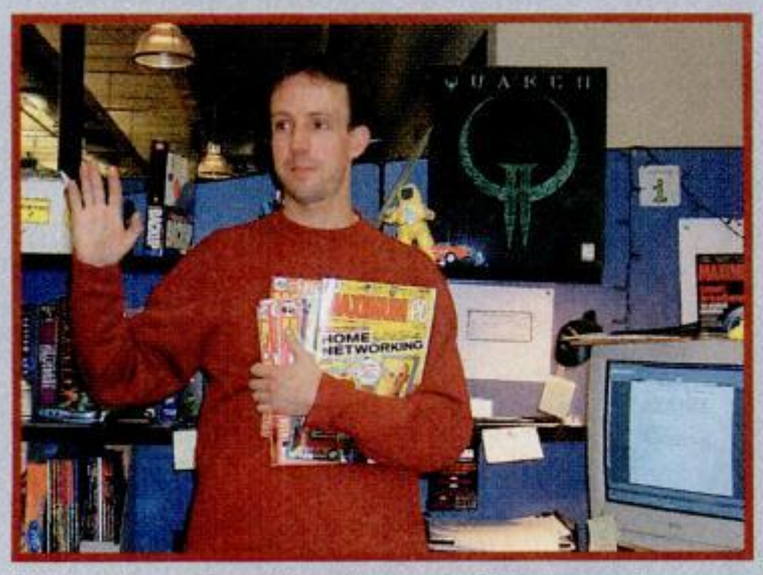
Shut That Maxtor Up!



When we first reviewed Maxtor's DiamondMax hard drive, we noted that the drive could be set by OEMs to operate in one of two modes: Performance or Quiet. We were upset that we weren't allowed to make that decision ourselves, and it appears Maxtor listened. If you have a DiamondMax hard drive, head over to **www.maxtor.com/products/diamondmax/techsupport/technicalprocedures/21007.html** and download the "acoustic management" utility. Please note this procedure is for "advanced" users only.

See Ya, Wouldn't Wanna Be Ya!

This month, reviews editor Josh Norem announced to the staff that he was, in fact, "outta here." News of his impending departure to join the staff of *Motorcyclist* magazine sent the *Maximum PC* staff on an emotional roller coaster.



"I've enjoyed my time here, but that prank where Will replaced my desktop with an image of my desktop was just too much. See ya."

The staff was immediately distraught (muffled sobs) upon hearing the news. "Why has Josh forsaken me!" screamed Jon, rhetorically.

Realizing the finality of Josh's departure, staff members immediately cleaned up his work area and collected "souvenirs."

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A behind-the-scenes look at the Maximum PC Lab and the gearheads who work in it.

RIGHTEOUS LINK: PCGUIDE.COM

The PCGuide is exactly what it sounds like: a handy reference guide for all types of PC information. The site is maintained by Charles Kozierok, who must be criminally insane to provide this much information for free. Every imaginable topic relating to PCs is covered in detail and written with everyone from newbies to network admins in mind. The next time you're curious about anything PC, check this site first.

GEFORCE2 ULTRA VS. TRESPASSER

Can awesome hardware defeat possibly the worst game code in PC history? We decided to find out.

One of 1998's most highly anticipated games was Dreamwork's *Trespasser*. It promised to deliver an incredibly sophisticated physics engine and realtime terrain generation through an advanced software rendering engine. Uh… *yeah*. When the game hit shelves, not even the burliest PC could achieve double-digit frame rates. In our review, we wrote, "Under even the absolute best hardware conditions, *Trespasser* chugs around 20fps." Now that it's 2001, we figured nVidia's GeForce2 Ultra would be man enough to handle *Trespasser*'s pixilated graphics.

We fired the game up on a 1.5GHz P4/GeForce 2 Ultra combo, set the resolution to its highest setting (800x600), and waited. Guess what—it actually ran smoothly! Unfortunately, we had to settle for double- rather than triple-buffering, but perhaps when NV20 comes out, we'll be able to select that option.

The sad part is that the game still royally sucks even with smooth frame rates.

Lemon of the Month

Jon's Mouse Cozy

Jon has been talking about knitting a mouse cozy for a while now, and he finally did it. His seam work is decent, but his "fair isle" knitting style is amateurish at best. Note to Jon: Stick with magazine publishing, because your knitting sucks.

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www.maximumpc.com

Benchmarking: Full Disclosure

Visit **www.maximumpc.com/benchmarking** for the complete lowdown on *Maximum PC*'s benchmarking strategies.

21 PRODUCTS REVIEWED!

Hardware

- Aberdeen Claymore D90G 68
- HP Omnibook 500 70
- Toshiba Portégé 71
- Intel D850GB 72
- Asus P4T 72
- MSI 850 Pro 72
- Ace Discovery Station 4 74
- Boston Acoustic DPS5.1 76
- Altec Lansing ADA890 76
- Logitech Xtrusio DSR-100 76
- TDK VeloCD 16/10/40 .78
- Plextor Plexwriter 16/10/40A 78
- Labtech Pluse-424 79
- Kensington Expert Mouse Pro 79
- Linksys WAP11 80
- DLink DWL-1000AP ... 80
- DLink DI-713 80
- BuffaloTech AirStation .. 80

Applications

- Adobe Premiere 6 82
- Partition Magic 83

Games

- Project IGI (I'm Going In) 84

Hardware photography by **AARON LAUER**

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Aberdeen Claymore D90G

SLICES AND DICES WINDOWS APPS WITH ABANDON

Claymore cuts down all but games.

PLUSES
- Wicked-fast in Windows apps
- Beautiful Sony monitor
- 266MHz frontside bus
- 150GB of storage

MINUSES
- Pricey
- Blah gaming performance

Scottish Highlanders are legendary for their use of the two-handed broadsword called a claymore. A rather unwieldy weapon, the claymore could only be mastered by the most excellent of swordsmen.

Aberdeen's 1.2GHz Athlon box exhibits similar strengths and weaknesses. This modern-day Claymore cleaved through several of our tests but also had problems with benchmarks that require the finesse of a fencing foil.

Aberdeen based the Claymore on a new Abit KT7A-RAID motherboard that uses VIA's new KT133A chipset. Basically a refresh of the KT133 chipset, the "A" adds support for a 266MHz frontside bus. Aberdeen armed this bus with a 1.2GHz Thunderbird Athlon, which makes for a winning combination. The Claymore posted a phenomenal score of 218 in *SYSmark 2000*, a benchmark that gauges how fast a PC can race through action scripts in a dozen popular Windows applications. We've seen faster scores from custom-built, not-for-public-consumption machines (for example, our last Dream Machine project hit 235, and an AMD reference box armed with DDR memory hit 238), but the Claymore did indeed take the *SYSmark* title from other OEM-built machines, besting the HP Pavilion 9720's score of 205. This HP system runs a 1.2GHz Athlon, but uses a 133MHz bus. The Claymore also slew all comers in our *Photoshop* benchmark, just edging Dell's latest Pentium 4-based system.

But just when we thought the Claymore would cut a swath all the way to the land of Kick Ass, the machine showed signs of fatigue. Its 12x Creative Labs DVD-ROM drive could only muster a score of 21x in *CD Tach*—that's far shy of the 30x average read speeds that you'll get from today's 16x DVD-ROM drives. The Claymore's gaming scores were also woefully lacking. The machine's 32MB Gladiac GeForce2 videocard can't compete with the GeForce2 Ultra and Pro cards that have appeared in recent review machines. For example, HP's 1.2GHz machine comes with a 64MB GeForce2 GTS Pro and hit 100fps in *Quake III*. The Claymore, meanwhile, only hit 59fps. Doh! In our Direct3D benchmark, the Claymore lagged behind even 1GHz Athlon-based machines (at least those armed with GeForce2 GTS cards).

We couldn't definitively judge the performance of the Claymore's 150GB RAID array because our hard drive benchmark continually crashed. We won't blame Aberdeen because *HD Tach* isn't certified to test RAID arrays. We do know that dual 75GB IBM hard drives offer awesome real-world performance when striped together in a RAID 0 config.

The Claymore comes complete with a Sound Blaster Live! Platinum 5.1 card, a LiveDrive II bay, and MidiLand's rip-roaring 8200 5.1 speakers. Although this isn't the best set-up for quad-channel gaming, the speakers, combined with Creative Lab's DXR3 MPEG2 decoder, can turn the Claymore into a mini movie theater.

The Claymore's sharpest edge may be its Sony CPD-G500 monitor. Boasting a virtually flat screen and 0.24mm grille pitch, this 21-incher employs much of the same Trinitron technology found in the Sony F500—one of *Maximum PC*'s all-time favorite monitors.

The Claymore is the fastest PC we've seen so far in Windows applications, but its sub-par gaming performance left us baffled. We'd have substituted the 12x DVD-ROM drive with a Pioneer drive and switched out the GeForce2 GTS for an Ultra card.

—Gordon Mah Ung

TEST	ZERO	SYSTEM	RESULTS (%)	RANK
SYSmark	174	218	187+	LEADER
Hard drive	20.2MB/sec	WNR		N/A
CD-ROM	26x	21x	35.0	Unseeded
Photoshop	170sec	104sec	56.0	LEADER
Direct3D	38fps	63.6fps	341+	Unseeded
OpenGL	34.4fps	58.9fps	273+	Unseeded

Full benchmarking details at www.maximumpc.com/benchmarking/index.html

UNDER THE HOOD

THE BRAINS

CPU	AMD Athlon 1.2GHz
L2 cache	256K full speed
RAM	256MB PC133
Motherboard	Abit KT7A-RAID
Drive bays	Seven 5.25-inch external, two 3.5-inch internal, one 3.5-inch external, one 5.25-inch internal
I/O ports	Four USB I Two PS/2 I Two serial I One parallel I TV out I SPDIF out I Line out I Ethernet I Optical I/O I SPDIF in I Headphone out I Aux in I Mic in I Midi in I Midi out

DISPLAY

Video	ELSA Gladiac GeForce2 GTS 32MB DDR SDRAM
Monitor	21-inch Sony CDP-G500 (19.8-inch viewable)
Refresh@ max res	75Hz@2048x1536

STORAGE

Hard drive	Two 75GB IBM 75GXP Deskstar 7,200rpm, RAID 0
DVD	Creative Labs 12x
CD-R	Plextor 12/10/32A
Removable	3.5-inch floppy drive

NETWORKING

10/100 Ethernet

SOUND

Soundcard	Creative Labs Sound Blaster Live! Platinum 5.1
Speakers	S4 MidiLand 8200

THE BUNDLE

Windows Millennium

BOOT 0:48 DOWN 0:02

MAXIMUM PC VERDICT 8

$4,000 ($2,900 w/o monitor)
Aberdeen Computers
www.aberdeeninc.com I 888.300.5545

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EXPANSION NOTES

EXPANSION MAP

AGP:	Graphics card
PCI:	MPEG2 decoder
PCI:	Free
PCI:	Soundcard
PCI:	Free
PCI:	NIC
PCI:	Free

CASE | COOLING | POWER

CASE

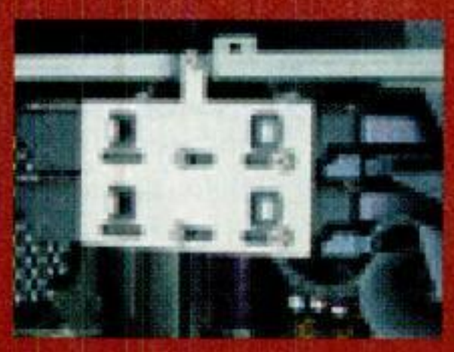
The Addtronics should be familiar to our readers—we built Dream Machine '99 with it. It offers excellent upgrade and cooling options.

COOLING

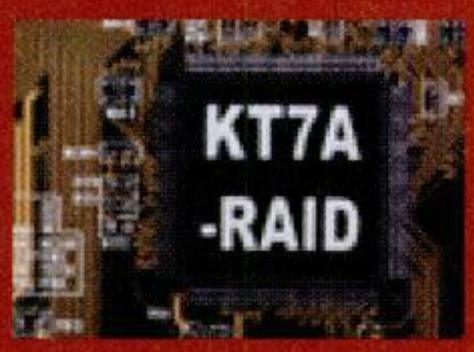
A Chrome Orb chills the T-Bird, while active cooling also keeps the chipset cold. Two 80mm fans suck air through the front bezel and a third 80mm vents the case above the power supply. Two 80mm fans mounted alongside the drives keep the optical drives frosty, and there's added room for three additional 80mm fans.

POWER

300-watt Addtronics



That's no moon, it's a pair of Deskstars! ATA RAID is the rage these, days and Aberdeen doesn't disappoint with a pair of 75GB 75GXPs.



Faster bus. VIA Technology's KT133A offers full support for Athlon Thunderbird CPUs with 266MHz (133MHz x 2) frontside bus speeds and PC133 RAM.

Active cooling. Modern chipsets demand cooling power. An Abit fan is mounted on this board to help keep it stable.

Best monitor in town? Sony's CPD-G500 is bright, flat, and just plain awe-inspiring. Perfect for gamers and graphic designers alike.

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HP Omnibook 500

A LOT TO LOVE IN A LITTLE PACKAGE

PLUSES
- Comfortable keyboard
- Stylish
- Well-designed docking station

MINUSES
- Scroll button is useless
- Suck-ass 3D performance

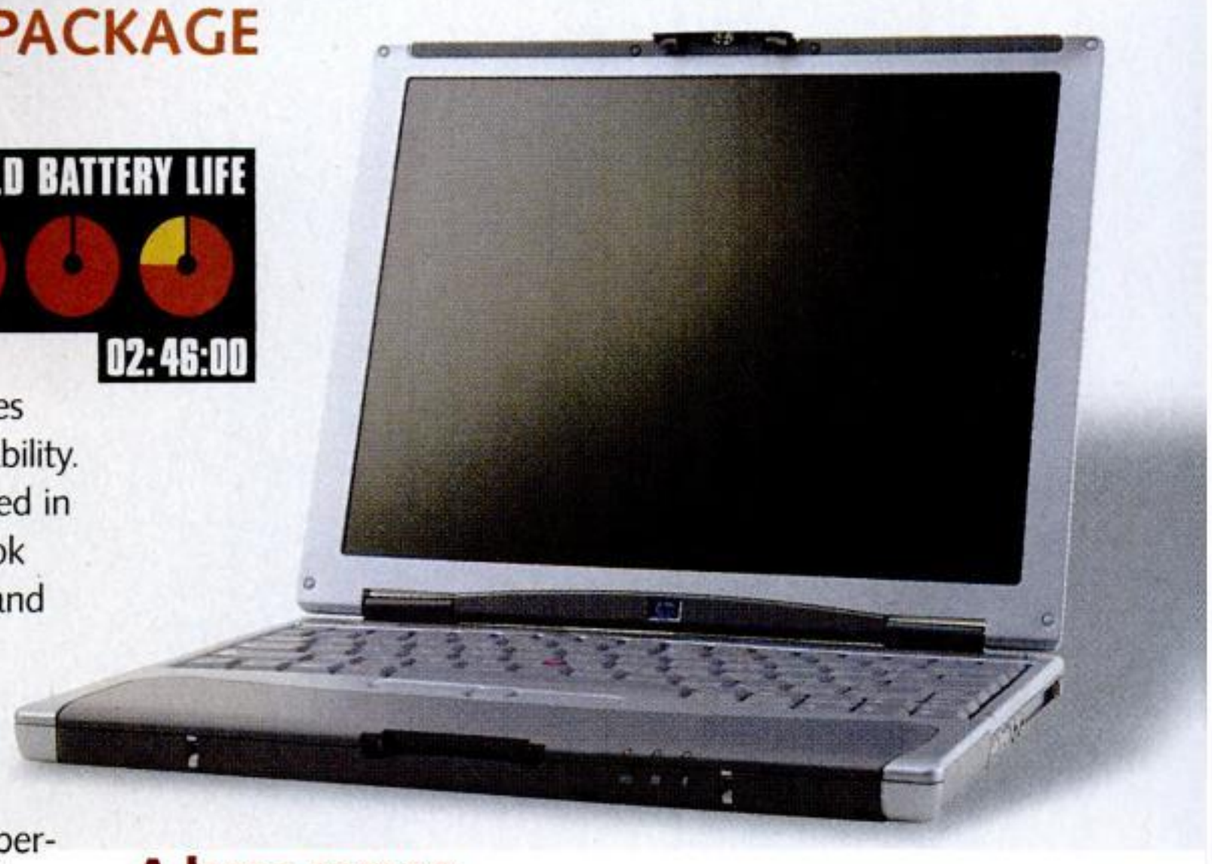
REAL WORLD BATTERY LIFE
02:46:00

There's a rich history behind Hewlett-Packard's double-naught Omnibook series, and the 500 stays true to its lineage of portability.

For an ultra-portable, single-spindle (one drive) notebook, the Omnibook 500 strikes an excellent balance of features, performance, and usability. Like the Toshiba Portégé, the Omnibook 500 is wrapped in magnesium alloy. But unlike the Portégé, the Omnibook 500 has a keyboard that accommodates larger hands and features a full-sized backspace key.

Internally, the OB500 is very similar to the Portégé. It features a SpeedStep Pentium III 600MHz that throttles down to 500MHz when operating on battery power. And, like the Portégé, the Omnibook comes packed with 128MB of PC100 RAM and an onboard modem. But HP added a few features to the Omnibook 500 that give it an edge over the Portégé. The first is a larger, faster 20GB IBM Travelstar hard drive. Another is onboard Fast Ethernet. The Omnibook features only one PC Card slot, but HP managed to get two USB ports into the unit. HP also takes a stand against the wireless hoo-ha by leaving out an IrDA port. While we applaud bold decisions, we must point out that the lack of IR spells bad news for people who want to sync PDAs or send wireless print jobs.

The Omnibook takes a significant hit by including the ATI Mobility M1 graphics chipset. It isn't a bad chipset, but ATI's Windows 2000 drivers redefine suckitude. Intense 3D gaming is out of the question for the Omnibook 500, but games that make fewer resource demands (such as *Solitaire*) should be just fine. The Toshiba takes the cake in gaming tests, but the Omnibook kicked the holy crap out of the Portégé in the Adobe *Photoshop* action script test and edged it in the Windows application test *SYSmark 2000* as well as in *HD Tach*, which gauges hard-drive performance. We attribute some of the performance gap to the different operating systems—the HP ships with Windows 2000, while the Toshiba comes with Windows 98.



A large screen and comfortable keyboard give the Omnibook a full-sized feel.

The Omnibook's stellar performance is matched by its docking station. Two drive bays handle such accessories as a Zip 100 drive, a CD-RW drive, a DVD drive, and extra batteries. The docking bay has the usual assortment of I/O options, including serial, parallel, VGA, mouse, keyboard, S-video out, an Ethernet passthrough, and two USB ports. The dock will play audio CDs with the notebook turned off and offers a full set of CD controls. The dock's Polk Audio speakers and tiny internal subwoofer make playing audio through the notebook seem like an appealing prospect, but we were discouraged after hearing the tinny sound quality.

Our review unit was an early production unit that had a few rough edges. For instance, plugging the laptop into the docking unit scratched the unit's shell, but HP assured us that full production units won't have any such blemishes. Despite lagging game benchmarks, the Omnibook 500's nearly-full-sized keyboard, slightly larger screen, and ability to snug away all messy components in a docking station make it a better notebook than the Toshiba next door.

—Gordon Mah Ung

UNDER THE HOOD

THE BRAINS

CPU	Intel Mobile Pentium III SpeedStep 600MHz/500MHz
RAM	128MB PC100 SDRAM
I/O ports	PC Card slot I 10/100 Ethernet I V.90 modem I VGA out I Two USB I Mic in I Headphone I Serial I Parallel I S-video out I Keyboard I Ethernet passthrough on docking station
Modem	3Com V.90 Mini PCI modem
LAN	3Com 10/100 Ethernet in Mini PCI

DISPLAY

Videochip	ATI Mobility M1 with 8MB RAM
Display	12.1-inch Active Matrix
Max res	1024x768 on LCD, 1600x1200 on VGA out

STORAGE

Hard drive	IBM Travelstar 20GB 4,200 DJSA-220
CD-ROM	Matshita UJDA310 4/2/20 CD-RW drive

SOUND

Sound	ESS Mestro PCI

TIPPING THE SCALES

Lap weight	3.6 lbs.
Carry weight	4 lbs. (w/power supply)

BOOT 0:52 DOWN 0:08

TEST	ZERO	SYSTEM	RESULTS (%)	RANK
SYSmark	105	128	21.9	Unseeded
Hard drive	11.4MB/sec	13.5MB/sec	18.4	Unseeded
CD-ROM	15.5x	13.2x	-14.8	Unseeded
Photoshop	240sec	202sec	15.8	Unseeded
Direct3D	14.4fps	WNR	N/A	Unseeded
OpenGL	18.8fps	13.9fps	-26.1	Unseeded

Full benchmarking details at www.maximumpc.com/benchmarking/index.html

MAXIMUM PC VERDICT 9

$2,640 ($3,040 with docking station and CD-ROM drive, CD-RW drive $490, Zip drive $235)
Hewlett-Packard | www.hp.com | 888.224.4247

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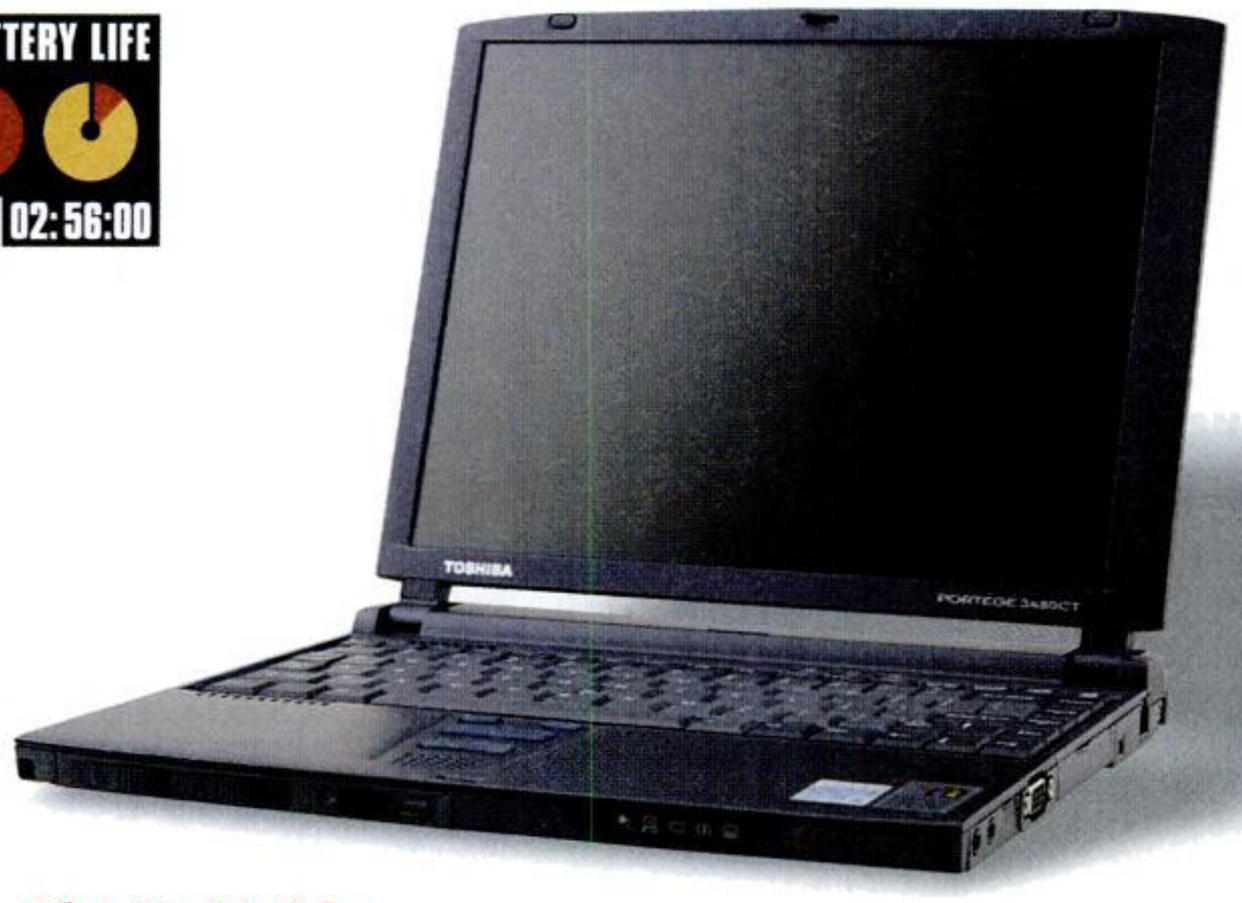
Toshiba Portégé 3480CT

CRAMMED WITH KILLER BATTERY LIFE AND PERFORMANCE

If a desktop replacement notebook is a 1970s muscle car, then Toshiba's Portégé 3480CT is a 240Z or a BMW 2002—nimble and sexy, but damned cramped.

Don't be fooled by the size of the Portégé. It's small, but it's loaded. Toshiba has packed a SpeedStep Pentium III 500/600MHz into the Portégé's magnesium-skinned shell. The notebook also sports the same S3 Savage IX graphics used by much larger desktop replacements.

Coupled with the 600MHz P-III, the Portégé has just enough power to run *Quake III* at 640x480. Sure, that's entry-level gaming, but let's be real, no one should expect to run *Quake III* on a sub-notebook such as the Portégé—that would be like asking a 240Z to take on a big block in a top-speed showdown.



The Portégé is too small for all its features.

UNDER THE HOOD

THE BRAINS	
CPU	Intel Mobile Pentium III SpeedStep 500/600MHz SpeedStep Pentium III
RAM	128MB PC100 SDRAM
I/O ports	V.90 modem I VGA out I Mic I Headphone I USB I IrDA I Two CardBus PC Card slots
Modem	Toshiba V.90
LAN	Toshiba 10/100 Ethernet
DISPLAY	
Videochip	S3 Savage IX with 16MB of SDRAM
Display	11.3-inch Active Matrix
Max res	1600x1200@60HZ
STORAGE	
Hard drive	Toshiba 12GB hard drive
CD-ROM	6x CD-ROM
SOUND	
Sound	Yamaha YFM752
TIPPING THE SCALES	
Lap weight	3.1 lbs.
Carry weight	3.6 lbs. (w/power supply)

BOOT 0:44 DOWN 0:05

The Portégé is well designed and seemingly rugged. The outer shell is a fairly thick magnesium alloy that feels quite solid. With its battery pack attached, the 3480CT weighs a scant 3.2 pounds and is less than an inch thick.

Onboard amenities include the standard fare: 128MB of PC100 memory, a single USB port, a front-mounted Fast IR port, a 12GB hard drive, and an external VGA output port. We wished the Portégé had onboard Ethernet, but Toshiba compensates by somehow fitting not one, but two Type II PC Card slots into the machine. The two slots give you the option of using Type III cards such as Xircom's popular RealPort series, which are too fat for a single slot. Additional connectivity is possible via an included port replicator that adds Ethernet, a single USB port, PS/2 mouse and keyboard, serial, parallel, and VGA out. The notebook also comes with a compact USB floppy drive that can be used in any USB-equipped PC. An optional multimedia port replicator gives you an optical drive and another PC Card slot and duplicates the functionality of the included replicator. Overall, connectivity and peripheral options are excellent.

We do have a few quibbles, however. Let's start with the teeny keyboard. Even after hours of use, we never really got used to typing on the Portégé's cramped key layout. The small backspace key and its close proximity to the home key also had us fuming. Furthermore, the programmable scroll buttons were a tad too high for our tastes and constantly rubbed on our thumbs. If you're a fast touch-typist with big hands, the Portégé will drive you nuts.

We dig the optional "battery plate" that Toshiba offers. By clipping a large flat lithium ion battery to the unit, you can up the Portégé's run time to an incredible eight hours. That's real "all-day computing," folks, and it's enhanced by a custom applet that gives the Portégé sophisticated power management abilities.

While we're impressed by the plentiful options and relatively diminutive size and weight of the Portégé, the smallish keyboard is the Achilles' heel of an otherwise stellar thin-and-light laptop.

—Gordon Mah Ung

PLUSES
- Very thin and very light
- Battery pack is awesome
- Two PC Card slots

MINUSES
- Damned cramped keyboard
- Too many peripherals to tote
- No onboard Ethernet

TEST	ZERO	SYSTEM	RESULTS (%)	RANK
SYSmark	105	123	17.1	Unseeded
Hard drive	11.4MB/sec	11.1MB/sec	-2.6	Unseeded
CD-ROM	15.5x	13.2x	-14.8	Unseeded
Photoshop	240sec	230sec	4.2	Unseeded
Direct3D	14.4fps	32.2fps	123.6+	Unseeded
OpenGL	18.8fps	29.7fps	58.0	Unseeded

Full benchmarking details at www.maximumpc.com/benchmarking/index.html

MAXIMUM PC VERDICT 8

$2,275, multimedia port replicator $400, DVD drive $380, high capacity battery $460 I Toshiba I www.toshiba.com 800.316.0920

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Pentium 4 Mobos

FABRICATING A FUNCTIONAL P4

If you're looking to build a system with Intel's new Pentium 4 processor, you're going to need two things: a good motherboard and our handy constructor's guide on page 60. Since you're already holding the second ingredient, let's concentrate on the first. Join us as we poke and probe three P4 mobos.

Intel's D850GB board isn't the fastest, but its rock-solid stability can't be beat.

Intel
PLUSES
Very stable

MINUSES
Slow benchmark scores
No overclocking options

Intel D850GB

This is Intel's reference motherboard for the Pentium 4; it contains Intel's latest core-logic chipset, the 850. With this chipset, Intel finally takes full advantage of Rambus RDRAM (earlier P-III chipsets limited RDRAM memory throughput). There are pitfalls inherent to the P4/850 motherboard combo, however. You may need a new case, power supply, and videocard, because Intel's latest technologies come with a fresh set of hardware idiosyncrasies.

For starters, the Intel D850GB—code-named Garibaldi—is set up to work in only "Pentium 4 ready" cases (meaning a case that comes with a power supply capable of feeding the power-hungry proc and a stable means of mounting a heavy copper heatsink). Also, of all the boards reviewed here, the D850GB is the only one without an AGP Pro slot. This is bad news for the high-end video crowd, though regular-old AGP gamers need not worry. Situated below the D850GB's vanilla AGP slot are five PCI slots and one CNR slot.

The D850GB didn't fare well in our benchmarks, losing to both the Asus and MSI boards in nearly every test. The one bright spot was in *SYSmark 2000*, where the D850GB tied with the Asus board. Keep in mind that although the D850GB lost in most tests, it lost by just a teeny margin, and Intel boards are known for sacrificing a bit of speed for the sake of increased stability.

Indeed, despite its somewhat lackluster benchmarks, the D850GB proved to be a very stable board. In fact, we sometimes wonder why we even do compatibility testing on boards with Intel chipsets—they're always rock solid.

Our real beef with the D850GB is its lack of advanced tweaking options. There are absolutely no overclocking features, and you have to switch a damn jumper just to get into the BIOS. Bull pucky! This user lock-out may be good for IT departments that don't want ham-fisted desk jockeys messing with things they know nothing about, but it's just plain antagonistic to enthusiasts.

Our other complaint is that the motherboard's layout may require you to purchase a new case or, at the very least, a new power supply. Owners of AGP Voodoo cards need to be aware that their cards won't work in any 850-chipset motherboard because the cards lack switchable voltages.

A lot of vendor-built P4 systems are shipping with the D850GB motherboard, and we recommend leaving this pile of silicon to the OEMs. Its uninspiring performance and lack of overclocking features make stability this board's only saving grace.

DARE TO COMPARE

MODEL	INTEL D850GB	ASUS P4T	MSI 850 PRO
Chipset	Intel 850	Intel 850	Intel 850
Supported processors	Socket 423 (Pentium 4)	Socket 423 (Pentium 4)	Socket 423 (Pentium 4)
Expansion slots	1 AGP/5 PCI/1CNR	1 AGP Pro/5 PCI	1 AGP Pro/5 PCI/1CNR
Memory support	4 RIMMs for 2GB of PC600/800 RDRAM	4 RIMMs for 2GB of PC600/800 RDRAM	4 RIMMs for 2GB of PC600/800 RDRAM
Overclocking rating	Awful	Excellent	Awful

BENCHMARKS	INTEL D850GB	ASUS P4T	MSI 850 PRO
Quake III Timedemo 1	116.0	**116.6**	116.0
SYSmark 2000	**188**	**188**	187
Sisoft *Sandra* MIPS	2650	**2671**	2627
Sisoft *Sandra* MFLOPS	826	**834**	820
Sisoft *Sandra* Streaming Integer	1335MB/s	1349MB/s	**1379MB/s**
Sisoft *Sandra* Streaming FPU	1361MB/s	1375MB/s	**1406MB/s**
3DMark 2000	47.1fps	**87.9fps**	87.3fps
Photoshop 5.5	130 secs	**126 secs**	128 secs

Note: Best scores are bolded. Settings for *Quake III Arena*: 1024x768, 32-bit color, trilinear filtering, maximum textures, 32-bit textures, Demo 1. Test bed: Windows 98 SE, Seagate ATA/100, 1.4GHz Pentium 4, GeForce2 Ultra, PC800 RDRAM. Compatibility Equipment: 3Com 3C905B NIC, Hollywood +, Abit Hot Rod 100, Sound Blaster Live!, T. I. FireWire card, Logitech USB Mouse, Storm USB Scanner.

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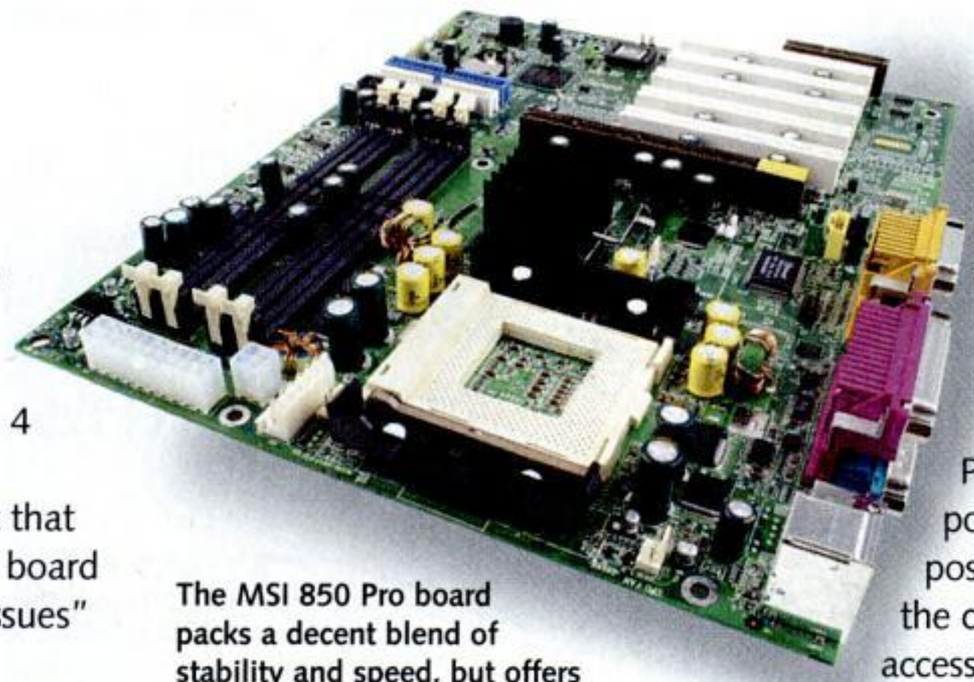


The MSI 850 Pro board packs a decent blend of stability and speed, but offers no overclocking options.

Asus P4T

Asus is the biggest Taiwanese motherboard maker, so we expected it to dispatch a heavy-hitter into the Pentium 4 arena. Now that the P4T has arrived, we can merrily report that our forecast was correct. This board is damn good, a few small "issues" notwithstanding.

The P4T comes equipped with an AGP Pro slot and five PCI slots. Instead of including a CNR slot, Asus decided to include an extra USB port adapter, which gives the P4T a total of four USB ports. Sacrificing CNR for USB is dandy with us, seeing as there are no CNR products available at this time.

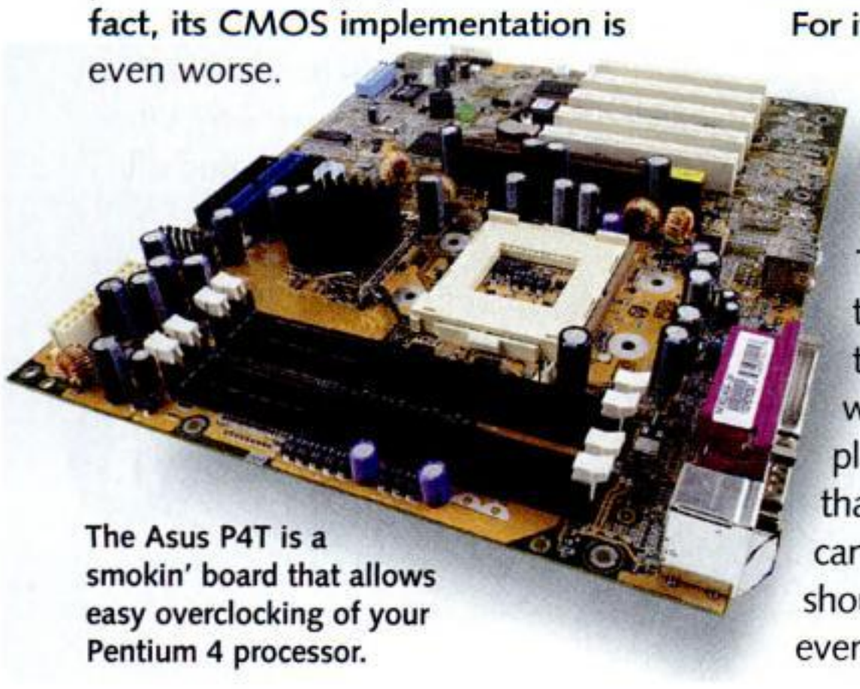
As stated above, some P4 motherboards require a P4-ready case for installation. Not the P4T. Asus precludes the need for a new case by including a mobo backing plate that attaches the proc's heatsink through the motherboard. With its heatsink in place, the mobo is then screwed into the case like a standard motherboard. It's a clever solution, but the weight of the backing board is about twice that of the mobo.

During benchmarking, the P4T was tops in nearly every test. The only test in which it didn't place first was the Sisoft *Sandra* memory assessment. It lost to MSI's 850 Pro by a small percentage.

Like most other Asus boards, the P4T is a champ at overclocking. Enter the BIOS and you find options for changing the proc's voltage, frontside bus speed, and even RDRAM speeds. The board has frontside bus speeds up to 133MHz and multiplier options up to 16x.

One of our biggest problems with Asus is the company's failure to make CMOS clearing easy. The P4T perpetuates the legacy of shame. In fact, its CMOS implementation is even worse. On other Asus boards— such as the CUSL2-C—there's a clearly marked spot to jumper the contact points for clearing the CMOS. On the P4T, however, there's no marking whatsoever. Hey, Asus, is it too much to ask that you clearly mark the freaking jumper?

CMOS irritations aside, the P4T is a nice offering. It's got features aplenty, impressive speed, and a dazzling array of overclocking options—what more could you want from a motherboard? Even with the crazy CMOS, this board would make a trustworthy backbone in any Pentium 4 system.



The Asus P4T is a smokin' board that allows easy overclocking of your Pentium 4 processor.

MSI 850 Pro

As any motherboard aficionado knows, MSI isn't a newcomer to the performance mobo scene. The 850 Pro reinforces MSI's commitment to churning out quality motherboards, but unfortunately lacks some horses under the hood.

Like the P4T, MSI's 850 Pro has an AGP Pro slot and five PCI slots. MSI, however, adds a CNR slot—we hope to see something in the near future that actually fits into this slot. MSI also chose to enable the audio capabilities built into the 850 chipset. Remember, folks, onboard audio sucks processor cycles. Our advice is to disable the onboard audio and install a halfway decent soundcard.

For its P4T motherboard, Asus uses a backing plate to hold the proc's heatsink. MSI has an equally inventive solution—a heatsink-retaining mechanism. This retainer saves you the trouble of buying a new case to install the board, and you won't have to install a backing plate either. The downside is that the weight of the heatsink can possibly break the proc, should the retaining mechanism ever become loose (Pentium 4 heatsinks weigh a lot more than other heatsinks because they're made of copper.)

The layout of the 850 Pro is nearly flawless. The power-supply connectors are positioned in a tight cluster, the case connector block is easily accessible, and the RIMMs are out of harm's way. The only black mark we noted in the layout is that the onboard IDE connectors are quite low on the board, which makes connecting optical drives that reside in large cases a real chore. This might sound like a minor gripe, but when using the board in our InWin full-tower test case, the situation became a serious female dog.

The MSI 850 Pro fared relatively well during benchmarking and even beat out the P4T in Sisoft *Sandra* memory scoring. Benchmark results in this roundup have to be taken with a grain of salt, however, as all boards scored extremely close to one another.

In the realm of overclocking, MSI fell asleep at the wheel. Rather than equipping its board with FSB-busting options and voltage tweaks, MSI chose to model its board after Intel's D850GB, which means the 850 Pro offers no overclocking options whatsoever. MSI may add overclockability in a future BIOS rev, but presently such amenities are absent.

In the final tally, the 850 Pro represents the middle ground in this roundup. It offers no overclocking options, but is relatively speedy. Asus' P4T is only slightly faster, but has awesome overclocking options. If you don't care about overclocking and hate buying Intel motherboards, the 850 Pro is calling your name. For all other users, we say stick with the Asus board.

—Scott Tarr

ASUS PLUSES
- Jumperless
- Fast
- Overclocking-friendly

ASUS MINUSES
- Nonexistent CMOS jumper
- Backing plate makes the board heavy

MSI PLUSES
- Nice board layout
- No need for new case

MSI MINUSES
- No overclocking options
- Onboard audio

INTEL D850GB — 6
$215 | Intel
www.intel.com
877.649.5817

ASUS P4T — 9
$265 | Asus
www.asus.com.tw
510.739.3777

MSI 850 PRO — 8
$200 | Micro Star International
www.msicomputer.com
510.623.8818

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Ace Discovery Station 4

GET OUT YOUR CHECKBOOK—THIS BABY NEEDS HELP

This budget P4 needs a bunch of new parts.

PLUSES
- Pentium 4
- Beefy power supply
- Low price

MINUSES
- No CD-RW drive
- 32MB GeForce2 Card
- Separate DVD and CD-ROM drives?
- Uninspiring speakers

In real estate-speak, this machine from Ace is what you'd call a "fixer-upper"—a computer that includes all the parts you'd need for basic survival, but still requires renovation to reach its full potential.

The good news is that the Discovery Station is built on a solid foundation. It boasts a 1.5GHz Pentium 4 and 128MB of PC800 RDRAM in a dual-channel config. Not bad, right? Uh, yeah. After you get past the main CPU subsystem, the list of parts begins to get freaky. Instead of pairing the "ultimate gaming CPU" with the current ultimate in videocards (the GeForce2 Ultra), Ace includes a plain-Jane, 32MB GeForce2 GTS from Creative Labs. Granted, a P4 and a GeForce2 are far from crap, but the combination fails to meet the performance delivered by other systems we've reviewed of late.

Ace confused us again in the optical storage department. The Discovery Station includes the (now standard) top-of-the-line Pioneer 16x DVD-ROM drive and also throws in a Sony CD-ROM drive—a complete waste of the second drive bay since DVD-ROM drives can do everything CD-ROM drives can. It's like shipping a system with both a USB and PS/2 mouse, except worse. Ace should have ditched the quotidian Sony drive for a CD-RW drive. The sacrifice of a drive bay smacks of amateurism.

Nonetheless, once you get past the oddball mix of hardware, you encounter some real meat and potatoes. A SoundBlaster Live! card handles audio chores—good. A U.S. Robotics V.90 modem performs old-school Internet duties—also good. Finally, an Intel 10/100 Ethernet card tops off the package—not bad either.

The Discovery Station was ho-hum during benchmarking, as we expected, running neck-and-neck with other 1.5GHz P4 boxes in *SYSmark*, but lagging behind Athlon systems of lesser speed. Also as expected, the Station's dreamy IBM Deskstar hard drive ran as fast as other non-RAID PCs with Deskstar drives. The Pioneer DVD-ROM drive threw us a curve ball; it could never climb above 20x in our *CD Tach* benchmark—yet other DVD-115s have typically scored in the 26x to 30x range. We suspect a bad drive and won't fault Ace for the machine's poor *CD Tach* performance.

The machine's InWin case enclosure is a safe bet for the hot-running P4. In fact, Intel uses this very case for its reference machines. It's well-built and compact, yet roomy enough to accommodate easy upgrades. Luckily, the Discovery Station's ATX12V Delta pumps out 300 watts of juice—enough to handle almost anything you might stuff inside the case. The bundled ACS 56 4.1 speakers aren't Klipsch quality but are good enough for this package.

OK, so we've nit-picked the Discovery Station to death. But do all these minuses damn the box to *Maximum PC* hell? Not quite. The rig has a very significant redeeming quality: price. This puppy will set you back only $2,000, which is about $1,000 to $1,200 less than the other Pentium 4 boxes we've reviewed lately. For this low price, you give up a CD-RW drive, IDE RAID, the Ultra version of nVidia's finest, and kick-ass speakers. That's a lot of components to lose, but, who knows, maybe you like buying cheap and upgrading with abandon.

For someone who's looking to get into a Pentium 4 without breaking the bank and doesn't mind considering upgrades right out of the box, the Discovery Station is a decent pick. But if you're a power user who wants top-end components and ultimate power, look elsewhere.

— Gordon Mah Ung

UNDER THE HOOD

THE BRAINS

CPU	Intel Pentium 4
L2 cache	256K full speed
RAM	128MB dual channel PC800 Direct RDRAM
Motherboard	Intel "Garibaldi" D850GB
Drive bays	Three 5.25-inch, two external 3.5-inch, two internal 3.5-inch
I/O ports	Two USB 1.0 ports I One serial I One parallel

DISPLAY

Video	Creative Labs GeForce2 GTS 32MB DDR SDRAM
Monitor	NEC 19-inch AccuSync 95F
Refresh@ max res	1600x1200@76Hz

STORAGE

Hard drive	30GB IBM 75GXP Deskstar 7,200rpm
DVD	16X Pioneer DVD-115
CD	Sony CDU-4811 48X
Removable	3.5-inch floppy drive

NETWORKING

NIC	10/100 Ethernet on Intel Pro chipset
Modem	U.S. Robotics

SOUND

Soundcard	Creative Labs CT4760 Sound Blaster Live! XGamer/MP3+
Speakers	Altec Lansing ACS56 4.1

THE BUNDLE

Windows 98SE, *Intervideo WinDVD*

BOOT 0:46 DOWN 0:06

TEST	ZERO	SYSTEM	RESULTS (%)	RANK
SYSmark	174	181	4.0	Unseeded
Hard drive	20.2MB/sec	28.6MB/sec	41.6	Unseeded
CD-ROM	26x	20x	-23.0	Unseeded
Photoshop	170sec	112sec	34.1	Unseeded
Direct3D	38fps	69.4fps	82.6	Unseeded
OpenGL	34.4fps	86.3fps	150.9+	Unseeded

Full benchmarking details at www.maximumpc.com/benchmarking/index.html

MAXIMUM PC VERDICT 6

$2,000 ($1,700 w/o monitor)
Ace Computers
www.acecomputers.com
877.223.2667

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EXPANSION NOTES

On this PC, upgrades are necessary to bring it up to Dream Machine status. Two free PCI slots await your loving care, and, if you can afford it, there's also room for two additional RDRAM RIMMs.

EXPANSION MAP

AGP:	Graphics card
PCI:	Free
PCI:	NIC
PCI:	Soundcard
PCI:	Free
PCI:	Modem

CASE | COOLING | POWER

CASE

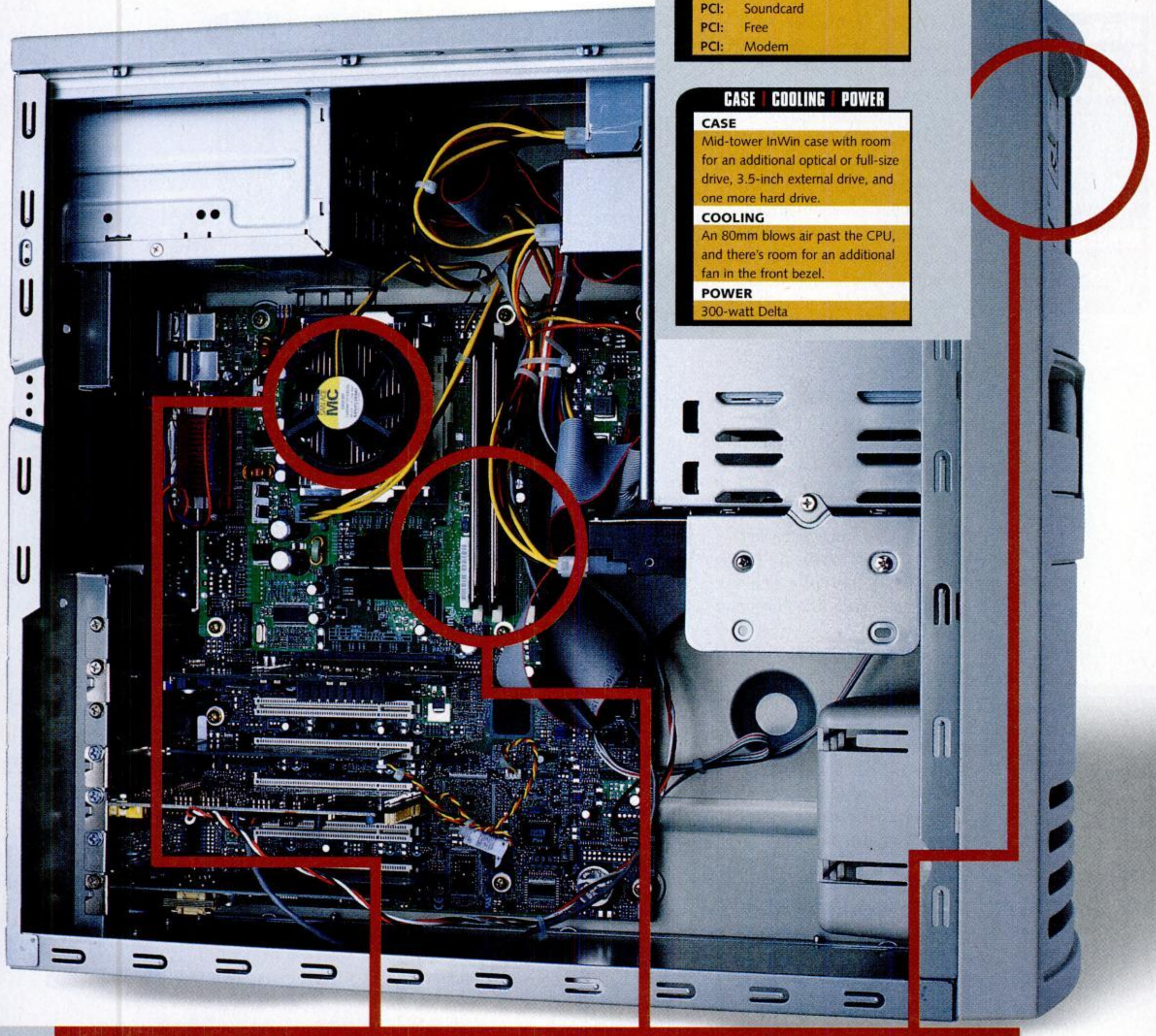
Mid-tower InWin case with room for an additional optical or full-size drive, 3.5-inch external drive, and one more hard drive.

COOLING

An 80mm blows air past the CPU, and there's room for an additional fan in the front bezel.

POWER

300-watt Delta



Not bad boom. The Altec Lansing ACS 56 speakers are not too bad, but certainly not our first pick for a 4.1 system.

Pentium 4. Who in their right mind would put a 1.5GHz P4 in a sub-$2,000 box? A system with the fastest processor should have the fastest of everything else as well.

Both channels. All Pentium 4 systems require filling two RIMM slots with memory to get the dual-channel memory bandwidth.

Silly redundancy. Having both a DVD drive and a CD-ROM drive is like the Chewbacca defense—it just doesn't make sense. We'd extract the CD-ROM drive and install a CD-RW drive.

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Surround-Sound Throwdown

RESOLVING THE DOLBY DIGITAL DILEMMA

Boston Acoustics

PLUSES
- Included remote
- Decent sound quality
- Very powerful despite modest RMS rating

MINUSES
- Pricey
- No DTS decoding

Readers of less "enthusiastic" PC magazines typically use wimpy, two-speaker setups for their PCs—but not the readers of *Maximum PC*. You want—nay, you require—five or six discrete channels, along with a dedicated subwoofer. You need Dolby Digital to bring your DVDs to life, and you need an amplifier powerful enough to cause rolling blackouts in your 'hood upon boot-up. Warm up your checkbooks as we take a look at the latest Dolby Digital speakers.

Boston Acoustics DPS5.1

The Boston Acoustics DPS5.1 is the second $600 5.1 speaker system we've tested recently. The other is the VideoLogic Digitheatre DTS, which received a Perfect 10 verdict in December 2000. Although the DPS5.1 is a high-quality speaker system that offers impressive tonal accuracy, it falls short of matching the Digitheatre DTS in features and sound quality.

The DPS5.1 is composed of four identical surround satellites, a center channel, and a band-pass subwoofer. All channels receive approximately 20W RMS, according to Boston Acoustics. The company doesn't list an RMS watt spec for these speakers, but an official reported it as 20W per channel, along with 105db maximum sound pressure. Although 120W is a paltry amount of power for a 5.1 system, the efficiency of the speakers allows for excruciating levels of volume without distortion. The 3.5-inch drivers used in the satellites produce bright, clear tones. However, the use of a full-range driver (rather than separate tweeter drivers) results in a slight loss of midrange, exacerbated by a crossover frequency of 160hz. The 6.5-inch ported sub delivers rich bass, but only dives down to 50Hz. The Digitheatre DTS sub, meanwhile, is capable of producing sounds as low as 30Hz. Our point: For $600, sound quality should be immaculate, but the DPS5.1 is only above-average.

Connection options include optical and coaxial digital connections as well as analog. These connections are exclusive, however, meaning you can select either analog output to the front channel (stereo), *or* 5.1 sound via the digital connection, but not both. This setup rules out quad-channel support, so quad-channel-enabled music and games can only be played in stereo or Dolby ProLogic mode.

The Boston Acoustic DPS5.1 system offers impressive power, but the somewhat lackluster features and sonic quality don't justify the exorbitant price tag.

The DPS5.1 includes a Dolby Digital 5.1 decoder and can only decode Dolby Digital 5.1. For $600, we expect features such as DTS decoding, and it's a shame the DPS5.1 can't oblige. In fact, while these speakers are priced in a league with the Digitheatre DTS, they seem to compete more directly with the Midiland 8200 speakers, which offer exactly the same connectivity and features, but with twice the power for half the price.

Don't get us wrong—the DPS5.1 isn't a bad system. It's just that the Digitheatre DTS costs the same and outperforms the DPS5.1 across the board. The Midiland 8200 system has the same features, but packs a bigger punch with half the price tag. Overall, these are superb speakers, but there are better options for the money.

Altec Lansing ADA890

All Dolby Digital speaker systems require digital input. But how many of these systems augment the digital input with the analog input you need for quad-surround gaming? Answer: few to none—until now, that is. This Dolby Digital 4.1 system from Altec Lansing offers simultaneous digital and analog inputs, allowing you to switch between stereo, quad surround for gaming, and Dolby Digital for movies, all at the push of a button. Every speaker system should offer this option—too bad the ADA890 system couples that great feature with

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lackluster power and sound quality.

These speakers offer both digital (coaxial and optical) and analog connections, so you can hook them up to, say, your PC and your PS2 simultaneously. If you have a soundcard with digital output, both its analog and digital connections can be used simultaneously to toggle analog and digital output at will.

The front-channel satellites offer three-inch drivers and one-inch tweeters, while the rear satellites contain only three-inch full-range drivers. If you don't have room for the rear satellites, you can plug them into the top of the front satellites. The satellites produce decent sound, but it's nothing to get overly jubilant about.

Altec claims that the 60W subwoofer delivers tones down to 27Hz, but we'd be surprised if it could even touch 50Hz. Bass response is decent at moderate tones, but overall the subwoofer lacks punch and has no headroom whatsoever. Crank the volume up and the satellites get louder while the sub remains at the same unimpressive volume.

Altec also claims 120W RMS for this system, but it sounds like much less. During testing, we repeatedly had the ADA890 system cranked to absolute maximum volume and still wished for more power.

As an all-in-one solution, the ADA890s are a solid offering, but don't excel at anything outside of offering quad gaming and Dolby Digital Surround for movies in one package.

Logitech Xtrusio DSR-100

Don't let the warning signs of suckage fool you—the Logitech Xtrusio system is awesome. Ignore the smallish satellites and aluminum subwoofer, because these speakers are the best 4.1s we've ever heard in this price range.

The system is composed of four identical satellites that receive 12W each, a 52W subwoofer inside an aluminum enclosure, digital and analog inputs, a tethered remote control, rear satellite mounting brackets, and a copy of *PowerDVD*. Overall, everything you need to quickly get this system running is included in the bundle, and we dig the inclusion of a software-based DVD player. The Xtrusio speakers also look quite slick, with their slim profile and gunmetal paintjob.

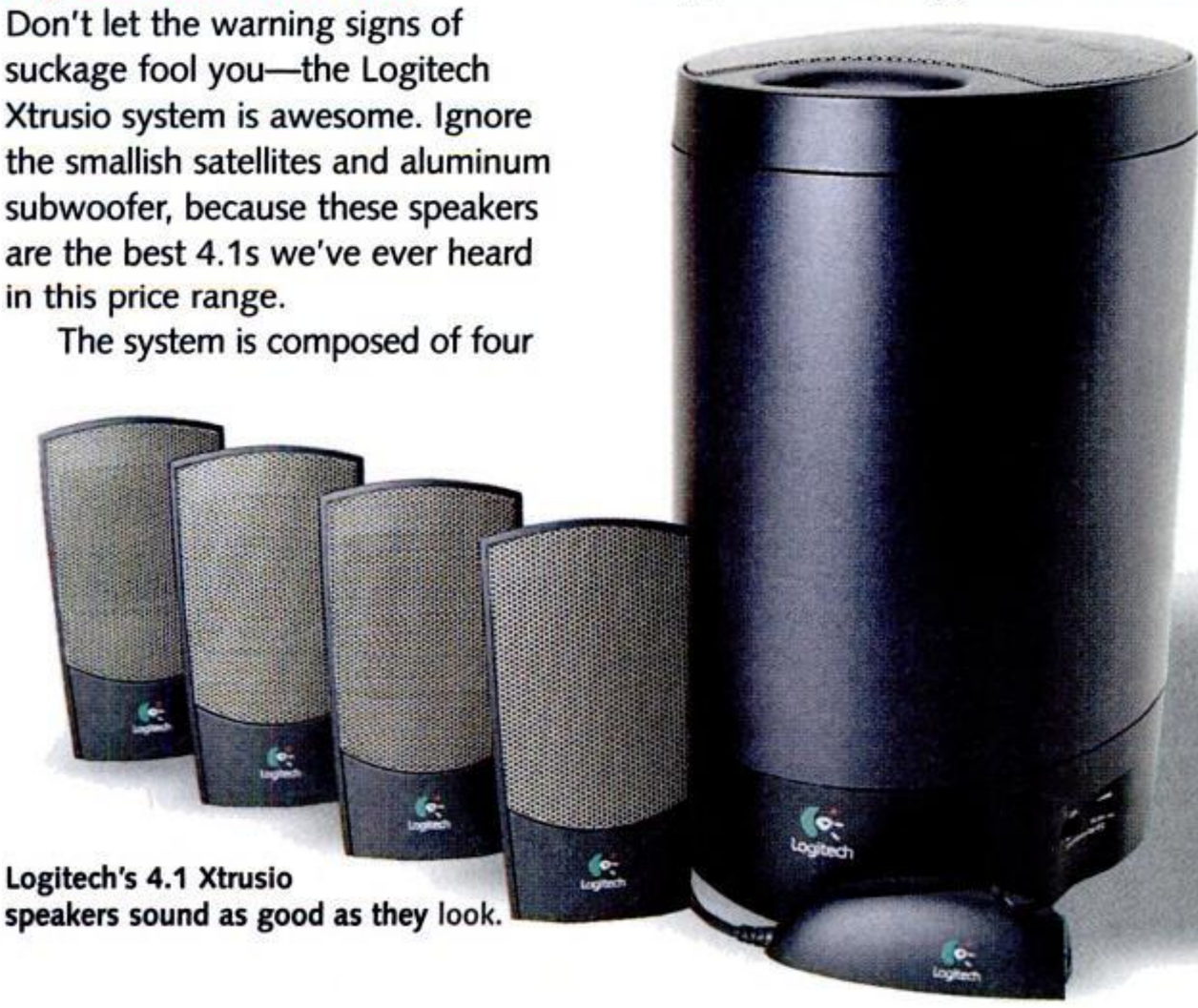
The ADA890 system from Altec Lansing does quad gaming and Dolby Digital surround sound, but not very well.

Upon firing these babies up in the Lab, we were instantly impressed. Our favorite MP3s and CDs sounded crisp and vibrant, with excellent clarity coming from the satellites' 2.25-inch drivers. The subwoofer, meanwhile, delivered a nice thump. The Logitech specs claim the sub can dive below the Klipsch ProMedia territory of 28Hz, but we seriously doubt it drops that far down. Nonetheless, we were smitten. The sub uses an extremely rigid aluminum enclosure rather than a traditional wood enclosure, so we were expecting tinny bass with no warmth or midrange—but we got the exact opposite. The sub also lets you manually adjust the crossover frequency for midrange and bass, a nice feature indeed.

Input options include dual-analog mini-jacks for separate front and rear channels, as well as a S/PDIF connector for sending a digital signal to all four speakers. Oddly, these speakers do not have a Dolby Digital decoder, so selecting digital input from your soundcard results in a significant reduction of volume (and hiss), but still delivers quad stereo to both front and rear channels. We asked Logitech why it bothered to include a digital input without a decoder, and were told that the input should be used to connect a CD player or some other device.

Other than the weirdness of the digital input, there's not much else to gripe about with these speakers. Sound quality is excellent, the 100W-power output is enough to satisfy headbangers, and the set is even semi-affordable. Just remember that the Klipsch ProMedia are only about $50 more, and offer four times as much power.

—Josh Norem



Logitech's 4.1 Xtrusio speakers sound as good as they look.

Altec Lansing

PLUSES
- Quad surround and Dolby Digital
- Decent sound quality and power

MINUSES
- Not powerful enough
- Weak sub
- Pricey considering the competition

Logitech Xtrusio

PLUSES
- Impressive sound quality
- Ample power
- SoftDVD player included
- Slick remote with headphone jack
- Decent sound quality and power

MINUSES
- No Dolby Digital decoder

BOSTON ACOUSTICS DPS5.1 8
$600 | Boston Acoustics
www.bostonacoustics.com
978.538.5000

ALTEC LANSING ADA890 7
$350 | Altec Lansing
www.alteclansing.com | 800.258.3288

LOGITECH XTRUSIO DSR-100 9
$180 | Logitech
www.logitech.com | 888.863.8312

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CD-Burning Brouhaha

TDK AND PLEXTOR FACE OFF IN A 16X SHOWDOWN

Plextor and TDK squared off with their 12x drives in our January 01 issue. TDK walked away with a Perfect 10, leaving Plextor with a lowly 9. Both companies now offer 16x drives, so who's the new CD-RW king?

TDK VeloCD PLUSES
- 16x writing
- 24x average ripping
- Killer software bundle
- Burn Proof

MINUSES
- Can't copy all games
- Same audio extraction speed as 12x drive

Plextor PLUSES
- 30x average audio extraction
- Burn Proof
- Full support for *CloneCD*
- 16x writing

MINUSES
- Software bundle sucks

TDK VeloCD 16/10/40

The 16/10/40 from TDK is very similar to the company's 12x drive. It's got Sanyo's Burn Proof buffer underrun prevention technology and packs the same *Nero 5*-based software bundle. The only features that have changed are an increase in recording speed from 12x to 16x and a jump in read speeds from 32x to 40x. Unfortunately, this drive doesn't offer faster audio extraction than its 12x sibling—both drives are capable of 32x maximum extraction speeds.

The drive performed as expected. The VeloCD required only five and a half minutes to create a 646MB data CD and hit its advertised 32x max audio extraction rate when ripping from the outer edge of an audio CD. The drive also averaged approximately 24x extraction speeds across the disk. Its random and full-stroke access times were a smidgen high, but not so much as to cause alarm.

The VeloCD is a mixed bag when it comes to making game backups. The drive supports 80-minute CDs and *Disk-at-Once* RAW mode writing, but is incapable of reading subchannel data (hidden tracks) from data tracks (so some CDs might not copy).

Overall, the VeloCD is a nice drive. If it could rip audio as fast as the Plextor and read subchannel data, it would be a Perfect 10.

TDK and Plextor face off for 16x CD-RW drive bragging rights.

Plextor Plexwriter 16/10/40A

This drive is hands-down the fastest in CD recording and audio extraction and is fully compatible with *CloneCD*. Like the TDK drive, it offers 16/10/40 speeds, but Plextor does it better by ripping audio at 40x. During testing, the Plextor ripped 340MB of Neil Diamond audio in a scant one minute, 39 seconds. The Plextor drive averaged 30x extraction speeds across the disk, without sacrificing audio quality.

Plextor's latest CD-RW drive includes the same wack software bundle we've complained about in past reviews, namely *Easy CD Creator* and the ever-buggy *Plextor Manager 2000* suite. The Adaptec software is slow and *Plextor Manager* is incredibly unstable. Trying to access the *Plextor Manager* applications caused our system to lock, and attempting to uninstall gave us the same result. We advise you to pick up a copy of *Nero 5* and ignore the Plextor bundle entirely.

This Plextor is the fastest CD-RW drive money can buy. The software bundle has some glaring blemishes, but when it comes to speed, Plextor reclaims the crown.

—Josh Norem

DARE TO COMPARE

MODEL	VELOCD 16/10/40	PLEXWRITER 16/10/40A
Buffer	2MB	2MB
Burn Proof?	Yes	Yes
CD SPEED 99		
Average data transfer rate (MB/sec)	4.34	4.54
Random/full-stroke access (ms)	118/236	134/250
Max. CPU utilization	11%	10%
AUDIO EXTRACTION TESTS		
Average extraction speed	24.07x	30.3x
Quality of extracted audio	Excellent	Excellent
MISC		
Data CD creation	5:34	7:12*
DAO RAW copying?	Yes	Yes
Software bundle	*Nero 5, TDK Digital Mixmaster, MusicMatch Jukebox*	*Easy CD Creator 4, DirectCD, Plextor Manager 2000*

Notes: All tests performed on Dell XPSB 733R with test drive set as master of secondary IDE channel. Extraction tests performed with *WinDAC32*. DAO RAW tests performed with *CloneCD*.
*Using *Nero 5*, data CD creation required only 5:37 seconds.

TDK VELOCD — 9
$300 | TDK
www.tdk.com
516.625.0100

PLEXTOR 16/10/40A — 9
$310 | Plextor
www.plextor.com
800.886.3935

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Labtec Pulse-424

BUY THESE SPEAKERS NOW!

Labtec has a reputation for producing crappy, underpowered desktop speakers, but the Pulse-424 system completely bucks the status quo. These speakers blew us away. For the money, the Pulse are the best 2.1 speakers we've ever tested and are second only to the Klipsch ProMedia 2.1.

The two plastic satellites are quite small, but deliver respectable sound quality (especially for Labtec). The satellites receive six watts each and crank out highs that are crisp and clear without being tinny. The control satellite even has a headphone jack.

The real shocker, however, is the quality and power of the subwoofer. Its wood enclosure houses an eight-inch passive radiator that receives 20W and delivers deep, thick bass that you can feel, even at very low volumes. At times it was even a bit *too* boomy. We're thankful that the unit includes a volume knob for fine-tuning. The sub is easily the most impressive unit we've ever heard in a sub-$200 speaker system.

We hate to sound like a broken record, but during testing we continually asked ourselves, "Are these really from Labtec?" The sound quality and power that the Pulse speakers deliver is a steal for $50. Buy a set now, or get two sets for a 4.2 setup that costs just $100!

—Josh Norem

The Labtec Pulse are far and away the best $50 speakers we've ever heard.

MAXIMUM PC VERDICT 9

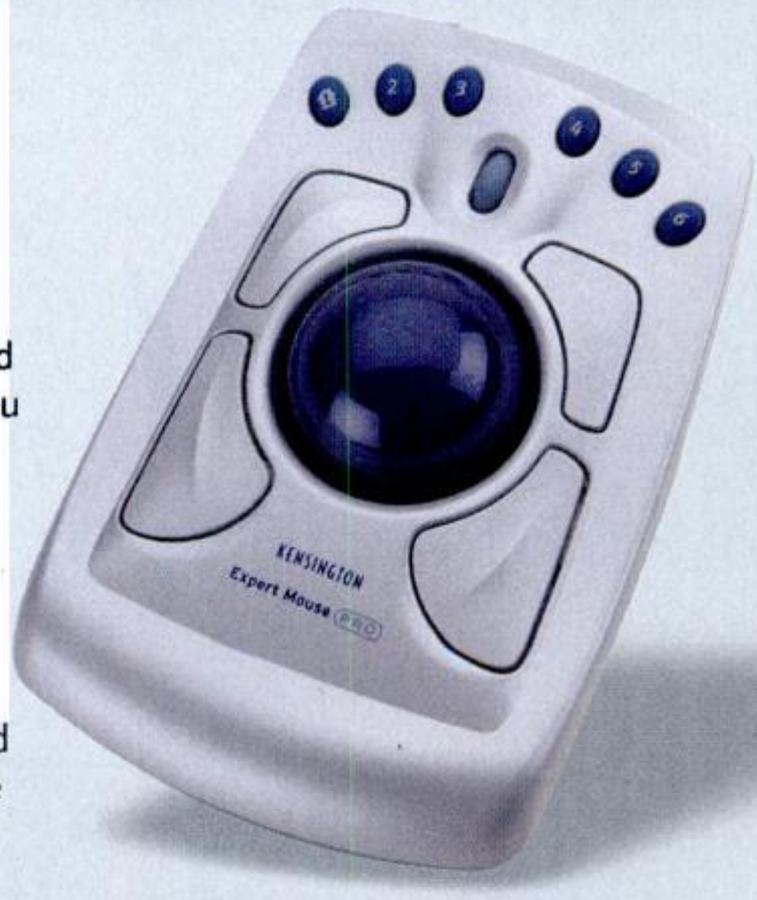
$50 | Labtec
www.labtec.com | 360.944.3753

PLUSES
- Deep, thick bass
- Good satellites
- Incredible performance for the price

MINUSES
- Sub is sometimes too boomy

Kensington Expert Mouse Pro

A TRACKBALL THAT DOES IT ALL



This monster mouse/trackball from Kensington is like a mini-keyboard for your hand. In addition to providing left- and right-click buttons along with a scroll wheel and trackball, the Expert Mouse includes USB and PS/2 connections, six quick-launch buttons, and a dizzying array of clicking and navigation buttons.

Using the trackball requires some dexterity, thanks to its large footprint and multitude of buttons, but the rewards are worthwhile. The two lower buttons provide left- and right-click functionality, while the upper two buttons can be programmed to perform functions such as double-click, close application, or anything else you'd like. You can press both buttons simultaneously to execute even more options—the same goes for the lower buttons. Naturally, the software lets you customize each of the 10 buttons, including programming quick-launch buttons to web pages or applications. The mouse can even be programmed to trigger a pop-up window after a specified period of time has elapsed, reminding you to take a break and helping you to avoid RSI. Sadly, however, this mouse will not take out the trash.

Our only complaint with the Expert Mouse is that it's rather blocky and requires an open-hand grip, which can be uncomfortable for long stints.

For general trackball use, we prefer the Microsoft optical trackballs reviewed in February, because of their more ergonomic design and relative ease of use. For those with flexible hands and a lust for macros, however, the Kensington Expert Pro offers more features than any mouse ever should.

—Josh Norem

Kensington's Expert Pro trackball has so many features, it's like an Internet keyboard for your hand.

MAXIMUM PC VERDICT 9

$100 | Kensington
www.kensington.com | 800.235.6708

PLUSES
- Features up the ying-yang
- Total customization of all buttons
- Great value

MINUSES
- Large and blocky
- Almost too many options

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Wascaly Wireless Wouters

WI-FI GATEWAYS: SAME TECHNOLOGY, DIFFERENT ITERATIONS

Linksys WAP11

PLUSES
- Easiest to configure
- Requires nothing but a USB computer to set up
- Good price

MINUSES
- No Ethernet ports
- No web configuration

D-Link 1000AP

PLUSES
- Good price
- Great for existing LANs

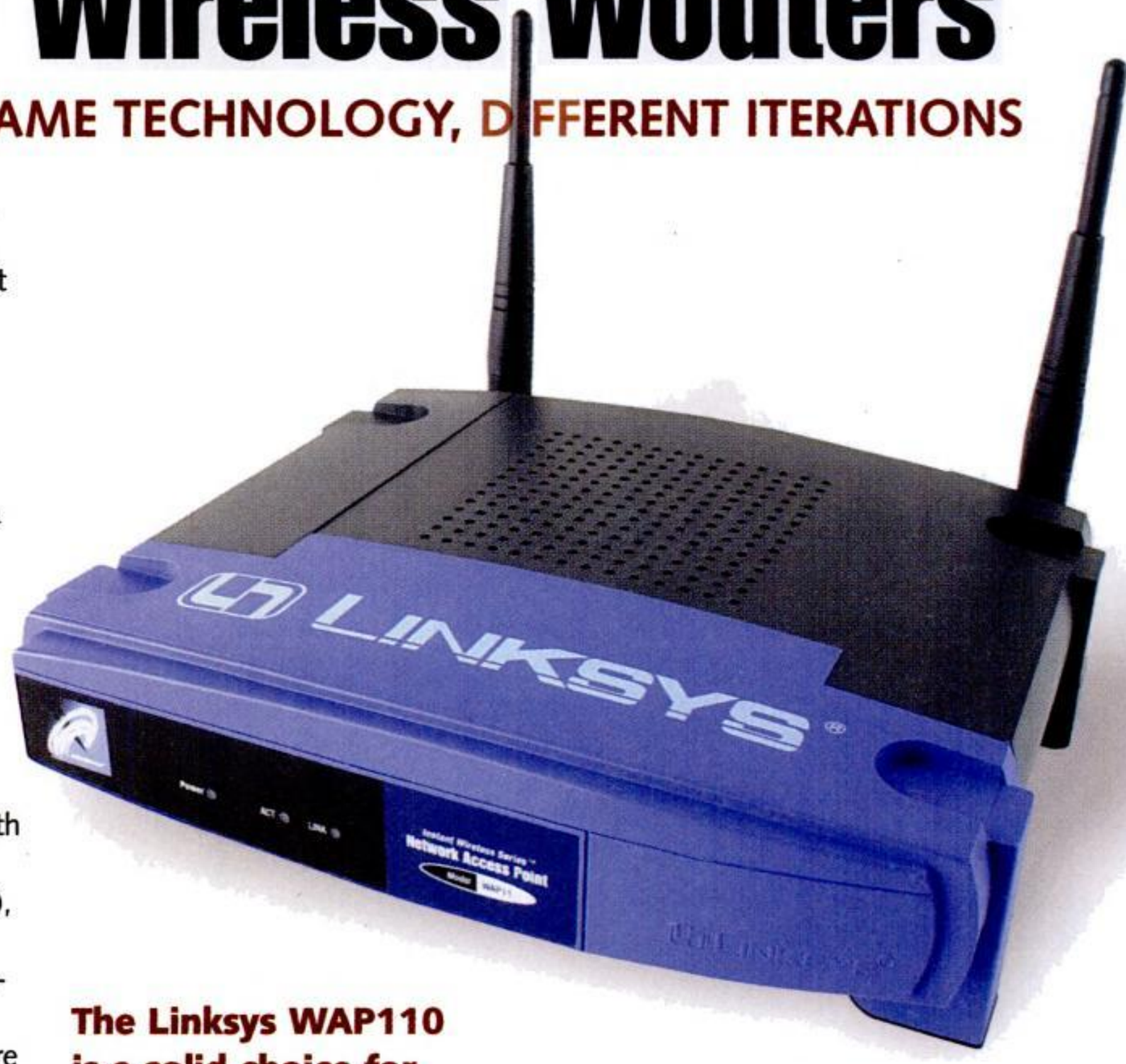
MINUSES
- No router
- No switch

Rarely do we see products within a single category deliver such wildly varying results. Despite the fact that the Linksys WAP11, the D-Link DWL-1000AP, the D-Link DI-713, and the BuffaloTech AirStation Router are all based on the same technology, some of the products truly rocked while others left such a bad taste in our mouths, we're still sucking Altoids weeks later.

These hardware "access points" all share a common function: They wirelessly connect computers strewn all over your house to your LAN. Several also have the ability to share a single IP address with all the computers in your home (via Network Address Translation or NAT), and one even includes three 10/100baseT Ethernet ports for computers tied into your existing LAN.

Ideally, you should spend no more than 20 minutes configuring this type of hardware, assigning things such as the network name (or SSID) as well as encryption codes and IP addresses. After the box is configured, you should be able to mount it in a high, hidden spot in your home and forget it's there, all the while enjoying high-speed wireless Internet access throughout your home. Fortunately,

D-Link's 1000AP is the perfect access point if you already have a NAT router set up on your home LAN.



The Linksys WAP110 is a solid choice for anyone looking to set up a wireless LAN in the home.

all the products we reviewed performed acceptably once we configured them, although the pain of configuration varied from device to device.

After the routers were up and running, we of course wanted to benchmark them. We ran two simple tests on all the routers. First, we connected another PC directly to the router using a 100baseT connection, if available. We connected to an FTP server on the wired PC and downloaded a 30MB AVI. The download time is reported in seconds. Then we connected to another FTP server on a wireless segment and downloaded the exact same file. Because Wi-Fi 802.11b LANs share 11Mbps of bandwidth, the second test should take longer than the first, unless the access point uses multiple channels to spread the load. If you plan on only connecting one node, the first benchmark is the only one you should care about. If you want to connect every computer in the house, the second benchmark is of major importance.

There's one last thing you need to be aware of before setting up a wireless LAN. Compared to old-fashioned Ethernet networks, wireless LANs add lots of latency. You probably won't notice the increased lag if you're playing games with others on the LAN, but if you play on the Internet, that last wireless link will probably add 30 milliseconds to your ping.

Now, this doesn't mean we don't like Wi-Fi 802.11b networking. The fact that we're willing to devote excessive tinkering time to get this stuff up and running is a tacit

DARE TO COMPARE

ROUTER	WIRED TO WIRELESS	WIRELESS TO WIRELESS
Linksys WAP11	53	114
D-Link 1000AP	55	110
D-Link DI-713	54	112
Buffalo Tech Airstation Router	57	112

NOTES: Our wired-to-wireless test consisted of FTPing a 30MB file from a server connected to a local 100Mbit Ethernet port to a laptop using a standard Wi-Fi-compliant PC Card. For the wireless-to-wireless test, the same file was FTPed from a server on the wireless LAN to another client on the same wireless node. The time is reported in seconds. Lower scores are better.

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endorsement of the technology. And products like the Linksys WAP11 make Wi-Fi really easy to love.

Linksys WAP11

Linksys' kit includes a router, but no other special features—unless you consider ease-of-use a feature. The Linksys box can be configured in less than 10 minutes with the provided USB cable and excellent documentation. Everything from routing options to SSID to IP address range is fully configurable, and the USB connection isn't required once the router is fully configured—at which point you can forget the box exists and enjoy leaving wires behind.

D-Link DWL-1000AP

We looked at two different D-Link products, the barebones DWL-1000AP and the plushly appointed DI-713. The 1000AP is simply a wireless access point and provides no NAT routing or firewall features. Configuring the 1000AP was a little more difficult than the Linksys WAP11, but not painfully so. Although you have to use a wireless connection to perform the configuration, all of the three vendor's Wi-Fi-compliant PC Cards that we tested worked just fine once they were properly configured. Once up and running, the 1000AP served files speedily and reliably.

D-Link DI-713

The DI-713's setup was just as easy as the 1000AP, although it would have been thoughtful of D-Link to include a serial cable to complement the serial port on the back of the unit; this would have eased configuration. The box performed on par with the other routers, turning in respectable benchmark times. The burning question is: Does the DI-713's ability to route both wireless and wired Ethernet connections using a single IP, along with the integrated three-port hub, justify the unit's high cost? If you don't already have a broadband router and a hub of some sort, the DI-713 is a great deal. But if you do, we recommend either the Linksys WAP11 or the D-Link 1000AP.

BuffaloTech AirStation

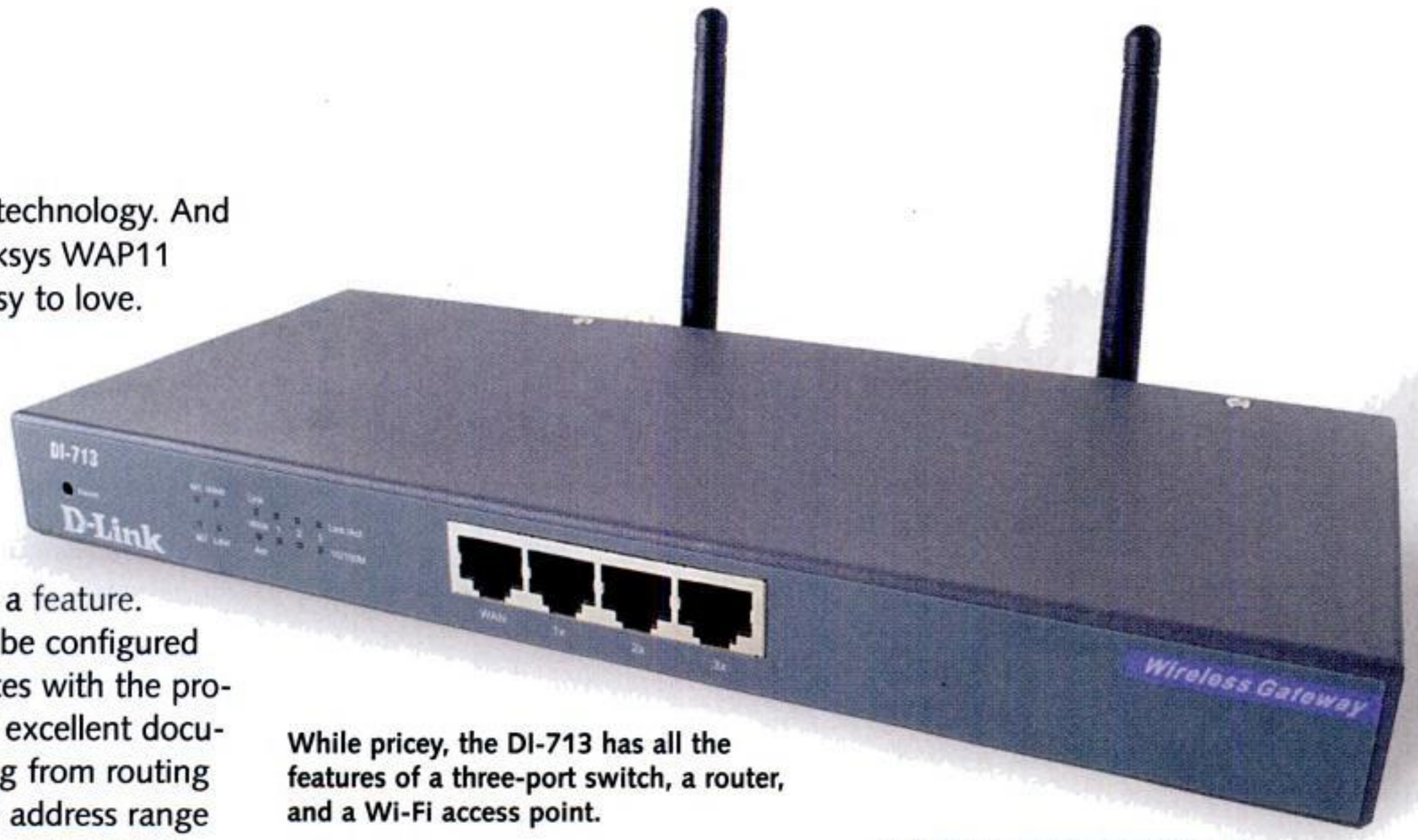
Where the Linksys and D-Link boxes shine, the BuffaloTech AirStation Router leaves a dull patina on everything it touches. Our main problem with the BuffaloTech router is its lame configuration procedure. We followed the provided directions using a PC Card from BuffaloTech but were completely and totally unable to get the AirStation working, even after several hours of labor. It was only through an accidental installation of the AirStation management software on a PC wired to the local LAN that we were able to configure it.

We hope the BuffaloTech router will experience the same fate as the animal that shares its name. Oh, how we'd love to drive this p.o.s. off a cliff!

The AirStation's shoddy plastic shell also stood out in our roundup. The front bezel on the AirStation is easily removed, despite the fact that there are no user-serviceable parts inside. Once we got the AirStation up and running, we didn't have any problems, and transfer speeds were wholly acceptable. But getting it running required about four hours more than we like to spend.

One year ago, an access point with no extra functionality would have cost around $1,200 and required a network engineer to configure. These new wireless access points are superior to the old hardware in many ways and are available at a fraction of the cost. We recommend the WAP11 if you don't intend to hook up any computers to a wired LAN. If you've already got a good LAN setup and don't want to pay extra for routing features, go for the D-Link 1000AP. And if you're starting from scratch and want to have both a wired and a wireless LAN in your home, opt for the DI-713.

—Verlin "Will" Smith



While pricey, the DI-713 has all the features of a three-port switch, a router, and a Wi-Fi access point.

D-Link DI-713
PLUSES
Everything you need for home LAN
Easy to configure
MINUSES
Expensive
May be redundant if you already have router/switch

BuffaloTech AirStation
PLUSES
Looks nice
Works great once configured
MINUSES
Atrocious documentation
Ludicrous setup procedure
Non-standard naming conventions

LINKSYS WAP11 9
$300 | Linksys
www.linksys.com | 949.261.1288

D-LINK 1000AP 9
$300 | D-Link
www.dlink.com | 949.753.7056

D-LINK DI-713 7
$500 | D-Link
www.dlink.com | 949.753.7056

BUFFALOTECH 5
$280 | BuffaloTech
www.buffalotech.com
310.965.0448

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Adobe Premiere 6.0

POWERFUL DV EDITING SUITE CATCHES UP

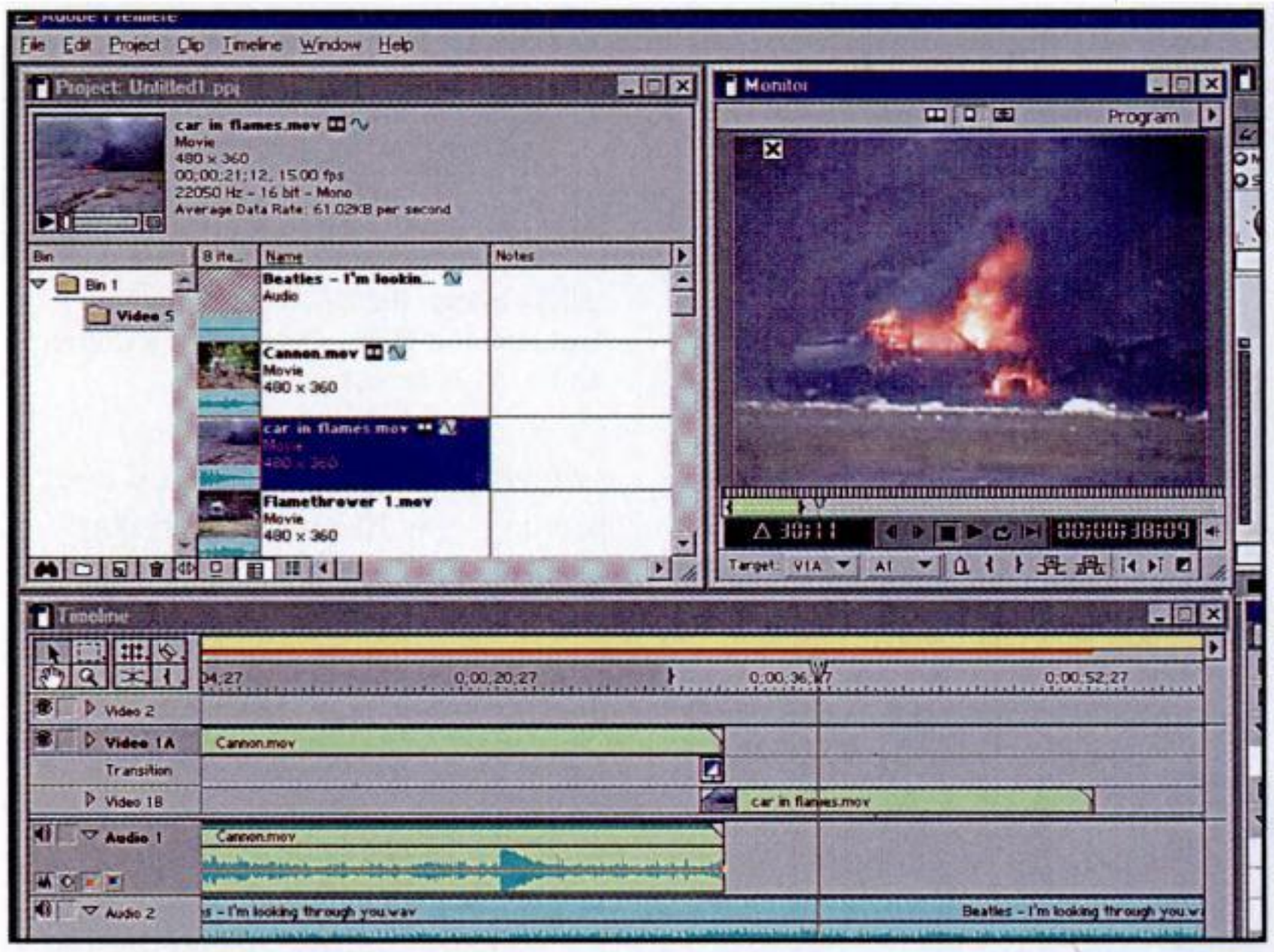
PLUSES
- Single-track editing option
- Improved audio capabilities
- Great selection of effects/transitions
- Wide third-party product support

MINUSES
- Conflict with some pro audio cards
- So-so realtime previews of effects/transitions

Since its debut in 1998, Adobe *Premiere* has been the industry standard for capturing and editing digital video. Although *Premiere* has remained ahead of the competition in terms of features and editing capabilities, it's never been perfect. To keep the program current, the Adobe faithful have had to prop up *Premiere 5.x* with a variety of excellent third-party products, many of which have been integrated into the long-awaited version 6.0.

The big news with 6.0 is the addition of support for a wider variety of FireWire (IEEE-1394) chipsets, as well as the integration of video-compression software. Enhanced support for 1394 chipsets allows for video capture with almost any DV handcam. Version 6.0 also makes web publishing easier with the inclusion of Terran Interactive's *Cleaner 5 EZ*. DV pros are known to run this application in the background while using *Premiere 5.x*, so its integration into the package is a greatly appreciated time saver. *Cleaner* is one of the best codecs built into Terran's flagship product, *Cleaner 5*, and it allows video to be crunched into RealMedia, Windows Media, QuickTime, and broadcast-standard MPEG in a range of qualities.

Premiere 6.0 also sports an improved interface that adds to the software's functionality. Professional single-track editing is now available as an alternative to the more elementary A-B roll environment. The new Storyboard feature allows you to hash out a rough cut faster than going clip-by-clip in the timeline. Tweaking audio levels with familiar mixer controls is a welcome add-on to the old "rubberband" method. Effects and transitions have also been beefed up with elements brought over from Adobe *After Effects*.



Adobe *Premiere 6.0* attempts to torch the competition, but falls a wee bit short.

Putting all these features to work revealed some rough edges, however. Crashes in NT and Windows 2000 boiled down to a disastrous conflict with a popular pro audio card, the Digital Audio Labs CardDeluxe. After repeated chats with Adobe tech support, we're still baffled by the problem but now realize that in order to run *Premiere 6* with NT, we need to have Service Pack 6 installed.

Another annoyance is the way *Premiere 6.0* previews transitions and effects. The program has to render them to show you a preview, which can take a very, very long time—the kiss of death in A/V work. Even our Dream Machine would take a few minutes to process a few simple transitions. This interrupts workflow and disrupts the creative process.

Premiere offers a few ways to sidestep this annoyance, but none are satisfying. One way is to output through a DV handcam's codecs to a TV monitor, which is itself time-consuming. Getting hi-res, realtime previews inside the program on the computer monitor is more challenging. The elegant solution is to add a pricey card from Matrox or Pinnacle to offload the task from the CPU. There's also an option within *Premiere* that lets you reduce resolution to give realtime previews, but there are obvious drawbacks to this approach. There's a screen preview option that's new to 6.0 and it's much better than 5.x's "wait and see" style. However, the quality of the preview is marginal. Programs such as Sonic Foundry's *Vegas Video* do a better job rendering on the fly at high resolutions without the need for extra components.

Premiere 6.0 has a lot of welcome features, but that simply means that *Premiere* is now on par with the competition. *Premiere*'s saving grace is that it's infinitely expandable through third-party add-ons. For those with humble aspirations, there are other video editing suites worth considering. But if Hollywood's a-calling, *Premiere 6* is the answer.

—Carl Lindemann

The new Storyboard feature lets you assemble video clips quick 'n' dirty and then export them directly to the timeline for fine-tuning.

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Partition Magic 6.0

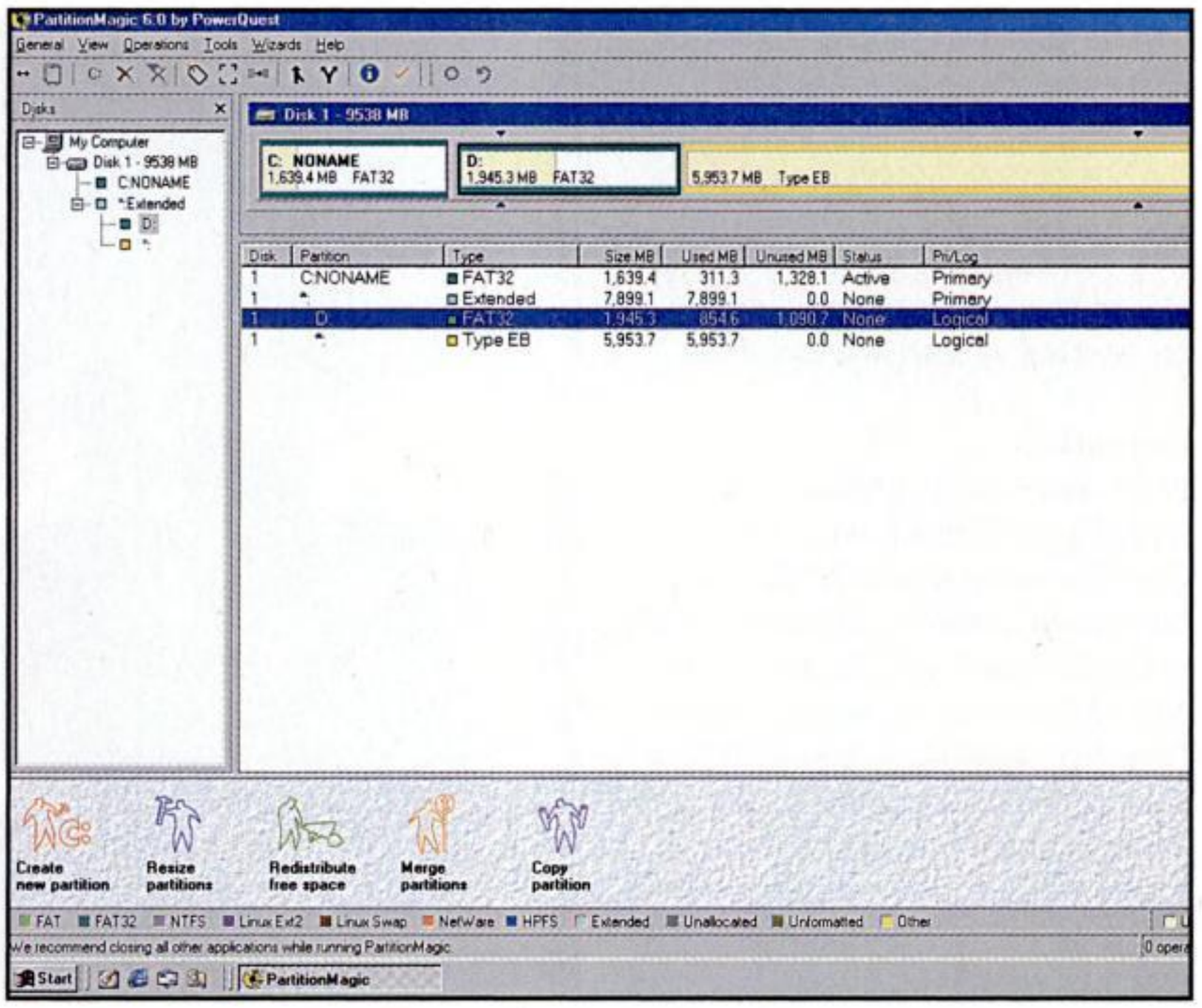
SLICES AND DICES PARTITIONS WITH EASE

If you're not aware of the power of partitioning software, you're sorely uninformed. Splitting a hard drive into bite-size partitions lets you store data in different protected sections of a single physical drive. Among other benefits, this allows you to separate your OS from all your other files, so you can reinstall the OS without ditching your applications and personal treasures in the process. Partitioning is also handy for keeping back-up files sequestered in a safe place in the event you're hit with a BSOD. Plus, if you ever get the testes to try out an alternative OS, you'll need to partition your hard drive to free up some space.

For all your slicing and dicing needs, we give you *Partition Magic*. This sixth version offers several welcome improvements, but also suffers from a few flaws.

PM6.0 includes native support for Windows 2000 and Windows ME, a wizard to help you partition, the ability to convert FAT32 partitions to NTFS, and password protection. Home enthusiasts should dig the OS support, and system admins should groove on the password protection. The new version's interface allows drag-and-drop copying and the moving and splitting of partitions. While these features are welcome, they're hardly something to jump for joy over. In fact, we'd really like to see a tool that reads the data on your drive and suggests the best filesystem to use.

Version 6.0 offers the same plethora of filesystem support that came with 5.0. Unfortunately, at least one "alternative" filesystem can't be modified or seen correctly by the utility: We tried using *Partition Magic* with BeOS's BFS filesystem and found that altering the partition on which an unsupported filesystem resides can mean total destruction of the OS.


PartitionMagic 6.0 by PowerQuest
General View Operations Tools Wizards Help
Disks
My Computer
Disk 1 - 9538 MB
C:NONAME
*:Extended
D:
Disk 1 - 9538 MB
C: NONAME
1,639.4 MB FAT32
D:
1,945.3 MB FAT32
5,953.7 MB Type EB
Disk Partition Type Size MB Used MB Unused MB Status Pri/Log
1 C:NONAME FAT32 1,639.4 311.3 1,328.1 Active Primary
1 * Extended 7,899.1 7,899.1 0.0 None Primary
1 D: FAT32 1,945.3 854.6 1,090.7 None Logical
1 * Type EB 5,953.7 5,953.7 0.0 None Logical
Create new partition
Resize partitions
Redistribute free space
Merge partitions
Copy partition
FAT FAT32 NTFS Linux Ext2 Linux Swap NetWare HPFS Extended Unallocated Unformatted Other
We recommend closing all other applications while running PartitionMagic.
Start
PartitionMagic

Partition Magic offers powerful tools to make your hard drive's life a lot easier.

One of the best features of *PM6.0* is its ability to preview changes before they're made. If an intended change will lead to horrible, data-altering modifications, *Partition Magic* will allow you to see that before it's too late. You also have the option of modifying changes in preview mode before they're made.

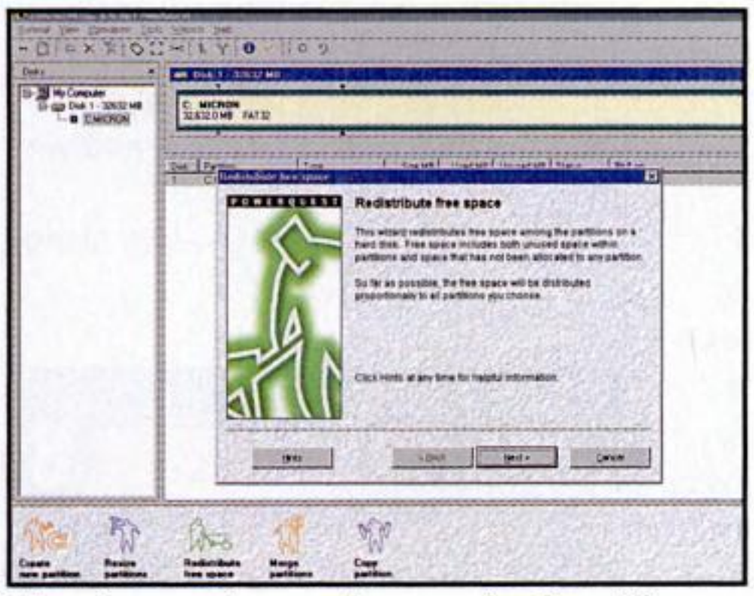
A Partition Undelete function comes in handy if you've deleted a partition by accident and want the partition resurrected.

To allow partitioning without entering Windows, *Partition Magic* lets you create startup disks that work in DOS. This is a great feature, but the program doesn't ship with these disks, so you'll have to install Windows to create them or create them from the CD—if you've got CD access in DOS, that is. We think Power Quest should have shipped the floppies with the utility.

Be aware that *Partition Magic* doesn't always play well with others. Some apps, such as *Norton Disk Doctor*, won't work once you've partitioned, requiring you to re-partition in a slightly different configuration in order to make the app happy. This isn't *Partition Magic*'s fault; in fact, the manual warns of the possibility of such erratic behavior. Some antivirus programs are just finicky. Also, Sound Blaster Live! users should note that the drivers need to be disabled when partitioning.

All the features *Partition Magic* gives you for modifying precious hard drive space make it hard to pass up. The lack of certain features notwithstanding, *Partition Magic* is a valuable tool to have.

—Scott Tarr



Wizards prevent users who are unfamiliar with partitioning from totally hosing their systems.

PLUSES
Support for lots of filesystems
Boot and drive utilities

MINUSES
Won't suggest more efficient filesystems
Must disable SB Live! drivers while partitioning

MAXTOR

8

$70 | Power Quest
www.powerquest.com
801.437.8900

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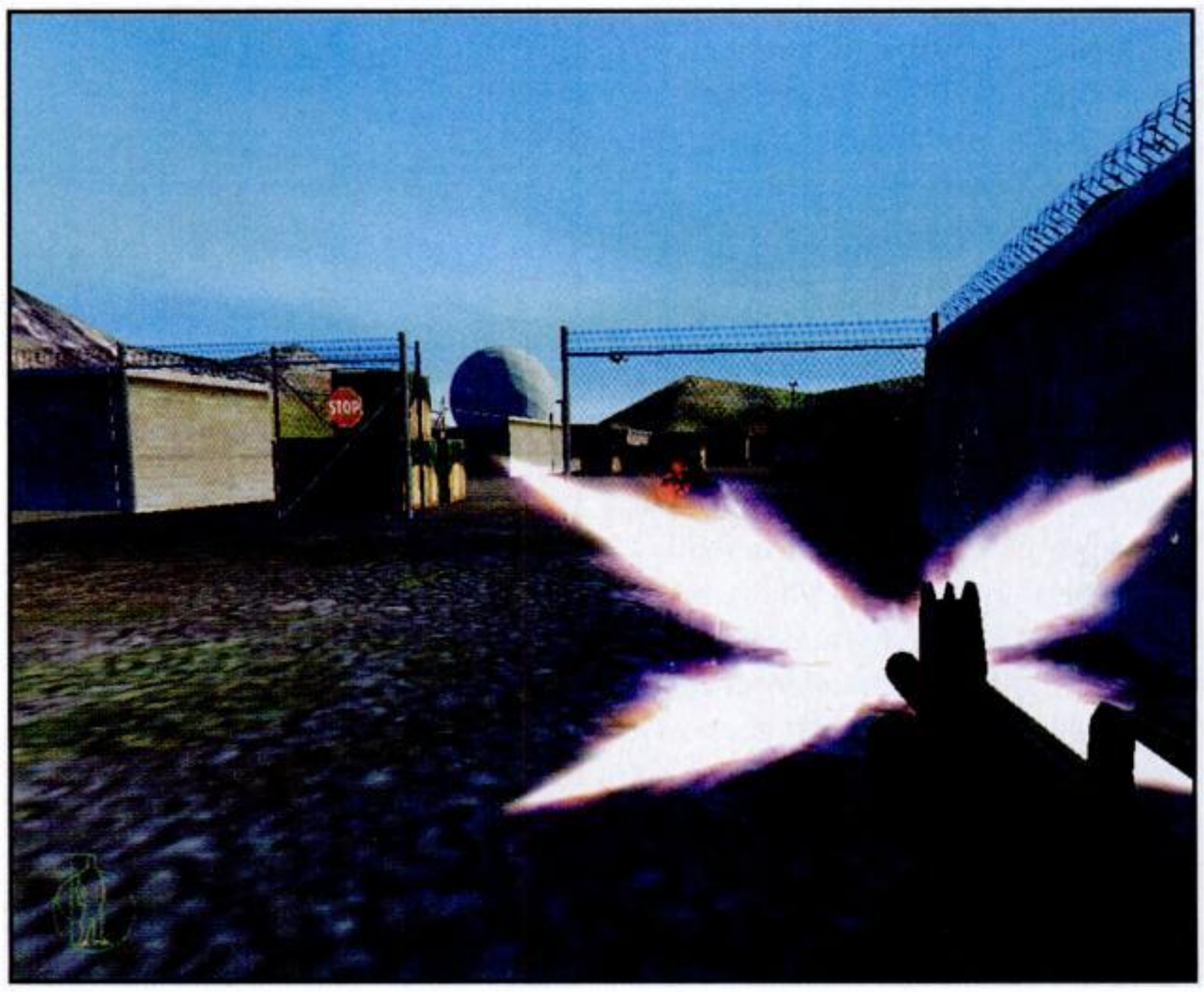
Project IGI (I'm Going In)

FLIGHT-SIM SHOOTER IS A LOVE/HATE AFFAIR

"Thinking man's" shooter games are all the rage these days, and after spending way too many hours playing the first-person shooter *Project IGI* (a.k.a. *I'm Going In*), it's easy to see why. Although this game has several glaring flaws, the gameplay is some of the best we've seen in a long time.



In *IGI*, you're pitted against Russian military forces in a variety of locales. This is our favorite tactic—all guns blazin'.

PLUSES
- Outstanding weapons and ballistics
- Intense gameplay
- Gigantic maps

MINUSES
- Horrible AI
- Respawning enemies
- No in-mission save feature
- No multiplayer

THE SPECS

3D CARD SUPPORT	3D AUDIO SUPPORT	MULTIPLAYER	TOTAL PLAYERS
Direct3D	DirectSound	None	1

Gameplay

In *IGI*, you play as a former British special agent named Jones through 14 objective-based missions. Each mission begins with a briefing where you learn what objectives must be completed in order to move on to the next mission. Objectives typically include infiltrating an enemy base, acquiring a certain device, weapon, or item, blowing something up, and—of course—killing everyone in sight. Jones carries a PDA that displays mission objectives as well as a map of the mission's territory. Use of this PDA is where the thinking part of the game comes into play, as it allows you to plan your attack by determining entrance points, building locations, and the movements of enemy guards.

Smart planning isn't just a good idea, it's a requirement, because failure means repeating the entire mission over again. There's no ability whatsoever to save your game in-mission! This issue may soon be addressed with a patch if there's a loud enough outcry from gamers frustrated by the lack of saves.

Technology

TerraForm, the engine used in *IGI*, is the offspring of a flight sim engine from the developer's previous title, *Joint Strike Fighter*. Although it doesn't offer the swirling doodads of the *Quake III* engine, TerraForm uses fractal technology to render maps measuring 20 square miles in size—and that's a real figure, not some fabricated number of "game miles." This means that the mountain you see in the distance is really there, and you can hike to the top of it if you have an entire day to kill. The expansive environments are relatively low detail, but the developers say their fractal engine produces textures procedurally as needed, allowing the engine to fit 10,000,000 kilometers of terrain information into texture memory.

Equally realistic are the weapon ballistics, which allow for bullets to either ricochet off of or pass through material depending on its composition. If you hear enemies lingering inside a wooden building, just shoot through the walls and kill everyone. The weapons are modeled after actual military hardware and are animated beautifully.

Who would've thought to mate a first-person shooter with a flight sim engine? *IGI* does it, and the maps are literally miles wide in all directions.

A host of bad guys that are about as smart as a bag of nails serve as the targets for your ultra-realistic weaponry. At close range they will duck for cover when they hear gunfire and even pistol-whip you if they run out of ammo. However, you can kill people from long range all day long without anyone even batting an eye. Kill a guard with the Dragunov SVD sniper rifle from a hilltop, and the guy standing next to him will do absolutely nothing. Making matters worse are enemies who respawn when alarms are activated, so you can clear a room, then return 30 seconds later to find it filled with more enemies. Huh?

With its gigantic maps and realistic armaments, *IGI* is perfect for multiplayer, but unfortunately it's not included. We hear a patch will soon add this option, à la *Deus Ex*, and we hope the rumors are true.

—Josh Norem

PROJECT IGI

TECHNOLOGY	8
GAMEPLAY	8

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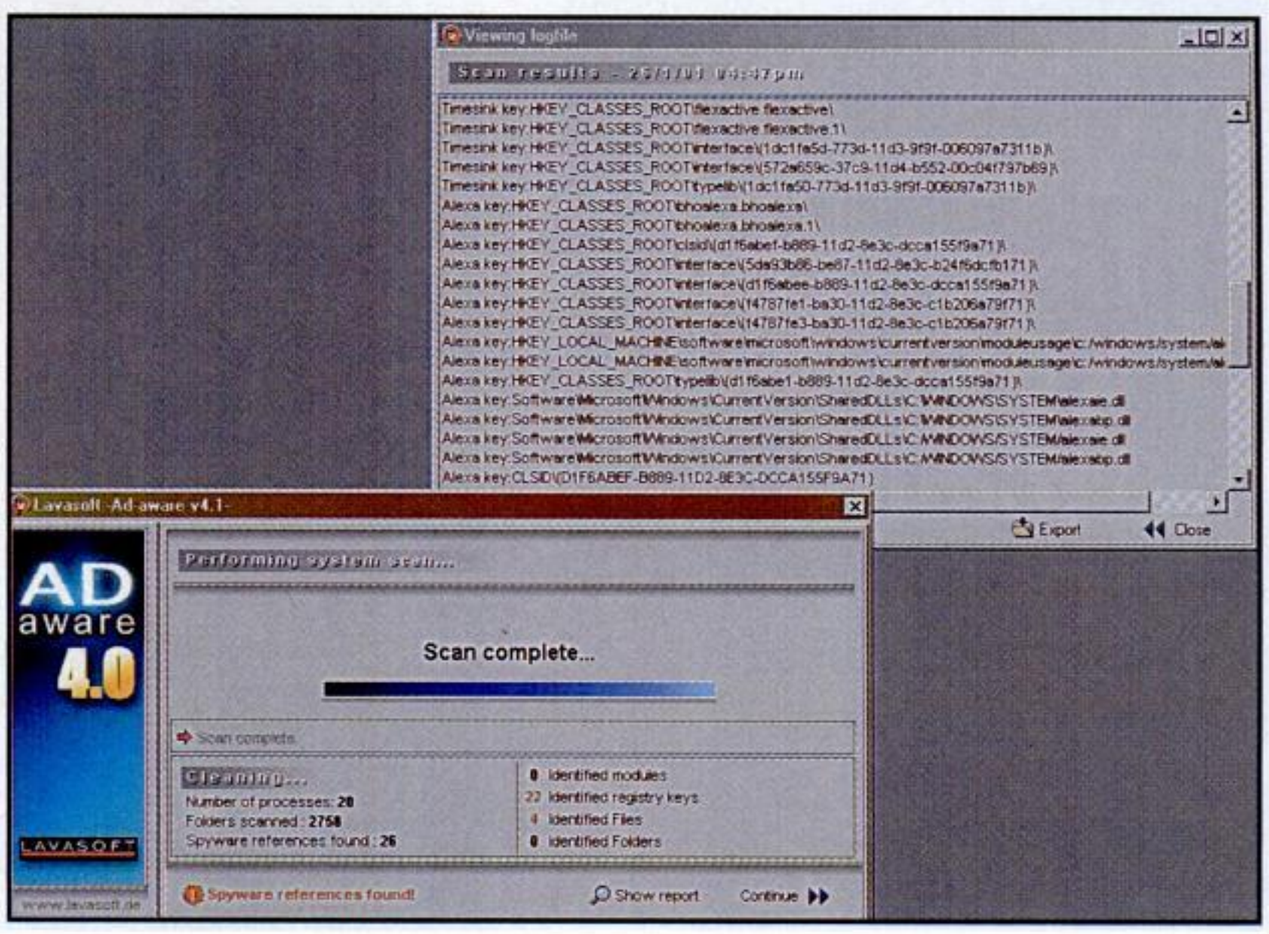
Anti-Spyware Utilities

SOFTWARE TO SMITE THE PEEPING TOMS

Nobody likes being spied on, especially when visiting "entertainment" web sites. But the sad truth is you're probably being watched more than you think. The problems can start when you download software applications from the Internet. Little do you know that the developers of some programs have been paid to accept adware (that is, flashing advertisements) embedded in their program code. Some adware surreptitiously contacts its originating site every time you jump online. The adware identifies your computer, then registers what banners you've clicked on and what sites you've visited. All of this is done without your knowledge. To add insult to injury, after you've deleted the original program (or paid for it, thus eliminating the flashing ads), the spying code can continue to operate, buried in folders and Registry entries that you're not even aware of.

Fortunately, such "spyware" code has generated enough concern in the online community to spur a number of privacy tools that counter the surreptitious tracking code. Here's a look at three such Big Brother-bashers.



***Ad-Aware* quickly finds spyware entries in your Registry, memory, and files, then offers to remove them.**

Ad-Aware

PLUSES

- Easy-to-use interface
- Works swiftly, flawlessly
- Lets you leave spyware "pieces" on your system
- Informative help system

MINUSES

- Must download latest version to keep abreast of new spyware
- Can search specific drives for spyware, but not specific directories

Ad-Aware 4.5

Lavasoft's *Ad-Aware 4.5* acts like an antivirus program and simply scans your computer's memory, hard drives, and Registry for the presence of known spyware apps. The program then notifies you about all entries it finds and lets you selectively choose which to keep or remove (you may want to keep some spyware operating because certain apps, such as Radiate's download manager *Go!zilla*, require the spyware to function). After you remove the spyware references, the offending code ceases to operate.

Ad-Aware has a small but useful group of settings. You can choose whether to run the program every time Windows starts and whether to remove spyware automatically upon discovery. The program also offers the options of autosaving a logfile and sounding an alarm when spyware is located. The included user's manual is informative but limited in an odd way. For instance, most entries in the index default to one of four long-winded explanations about everything from setup to how each of the spyware code types operates in detail. The information provided is useful, but you can only access it as a separate selection from your Start Menu, rather than from within *Ad-Aware* itself.

We tested *Ad-Aware* on several spyware-infected systems, and it squashed every offender swiftly and flawlessly. Most notable was the removal of four comet cursor Registry and file references that existed even after we'd used the developer's own uninstaller to remove the program. We hate the comet cursor!

The only spyware program that *Ad-Aware* is known to have trouble with is *Web3000* spyware, which can automatically replace your Wsock32.dll with its own integrated code. When *Ad-Aware* encountered this code, it properly refused to remove the offending files and referred us to *Web3000*'s web site for a special uninstaller.

While the version of *Ad-Aware* we tested is freeware, Lavasoft also offers a commercial product named *Ad-Aware Plus*. Rather than simply scanning on command, it provides realtime protection against the surreptitious installation of spyware code. We found it superfluous, however, since it's easy to run *Ad-Aware* manually after installing new software, and we don't like to add programs unnecessarily to our startup trays.

WebWasher 2.2.1

WebWasher is a browser plug-in that essentially acts as a filtering system. It does many things, including removing ad banners, popup ads, reloading web objects and animated images, and other annoyances from your browsing experience. The removal of such offenders speeds up your browser display and helps prevent the fits of rage that result from visiting sites with a never-ending cascade of spawning windows.

WebWasher's privacy features interested us the most. The program lets you store specific web sites in a "good cookie" list (for example, you might want cookies enabled when the exchange of cookie-supported information is required for shopping). A "bad

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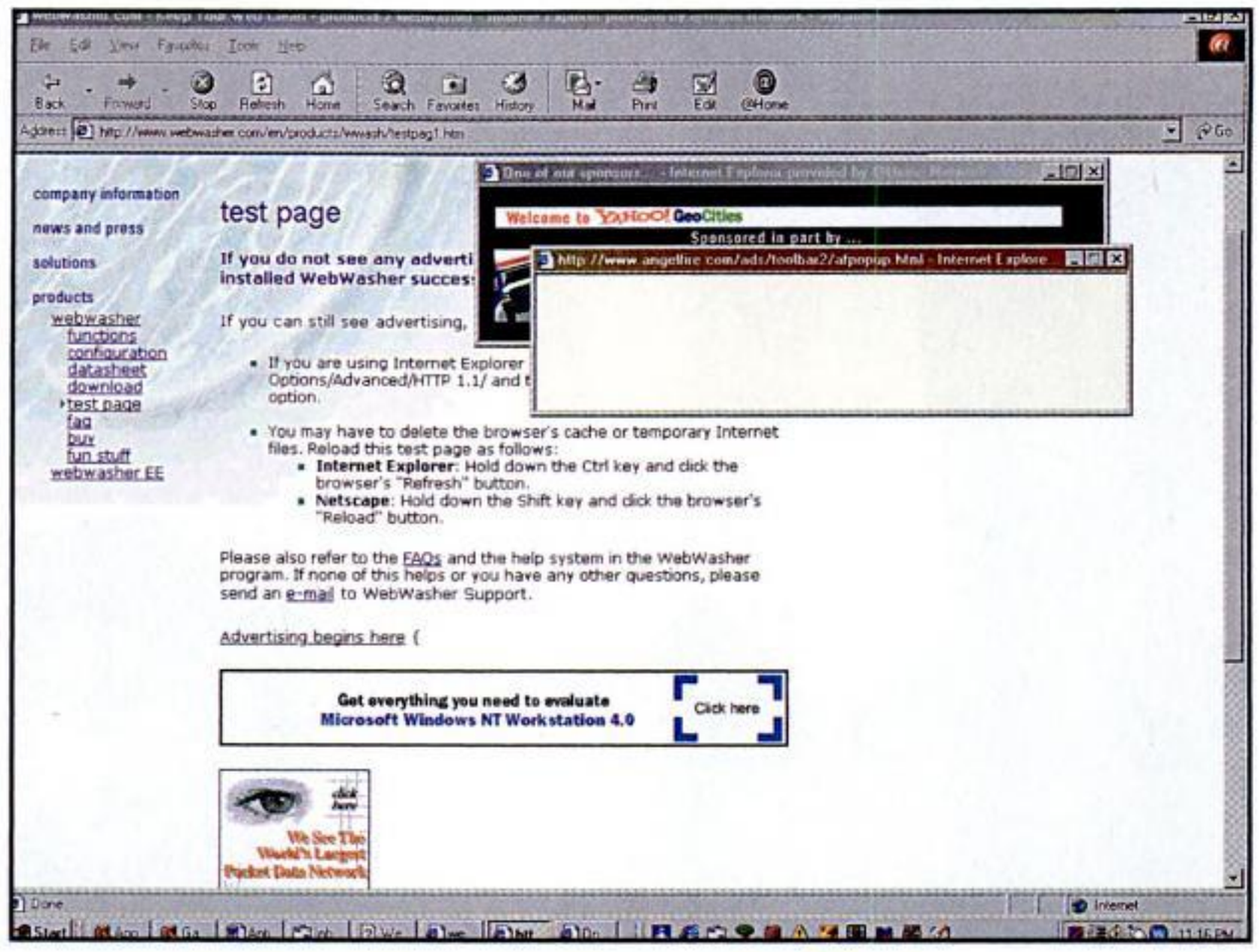
cookie" list is reserved for domains and hosts that could potentially use information to profile and track you. You can also establish an accept-all or refuse-all cookie policy or allow *WebWasher* to receive cookies while it sends out fake data in reply. The app refers to this setting as "neutral," because it "neutralizes" cookie information without refusing it.

WebWasher can also hide portions of referral strings—those lines of information that are sent to web sites when your browser requests objects (such as images or text). Since a referrer contains the URL of the last page you visited, it can be used to track your movements on the Internet, which is why they're of such interest to adware companies. *WebWasher* also prevents the execution of web bugs—those small, invisible graphics embedded in documents that send information to third parties. You can also set the software to block or filter specific URLs—a handy option, since some web sites actually download and install spyware on your system without asking.

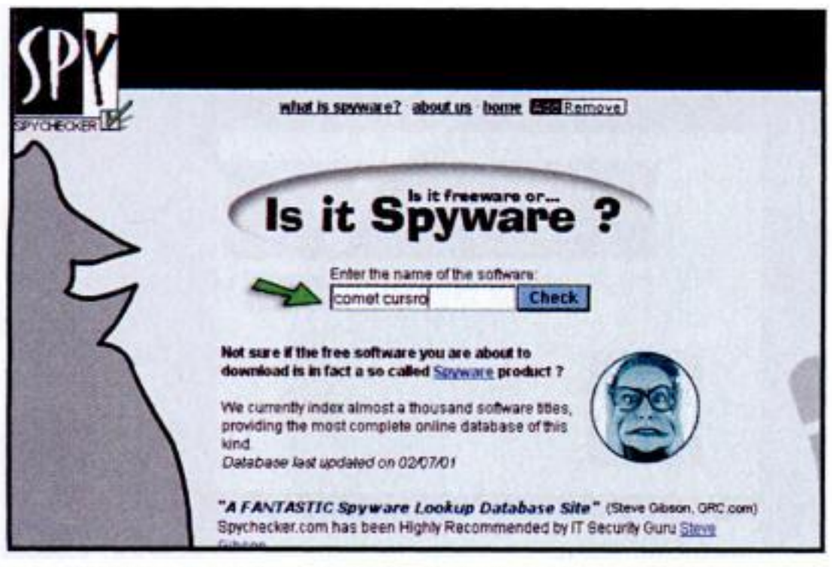
Configuring *WebWasher* is easy, but the program gives up some fine-tuning options in favor of simplicity. You can deactivate the software at any time by clicking once on the tray icon and reloading the current web page. For essentially the same application with more advanced controls, we recommend Scott Lemmon's *Proximatron*. It lets you choose how to handle specific HTML display elements. For example, banners can be removed, limited, or replaced with empty boxes.



***WebWasher*'s test page let's you see popup boxes and ads before they're configured in.**

Spychecker

Compared to *WebWasher*, *Spychecker* may seem rather limited.


what is spyware? about us home Add/Remove
Is it freeware or...
Is it Spyware ?
Enter the name of the software:
comet cursro
Check
Not sure if the free software you are about to download is in fact a so called Spyware product ?
We currently index almost a thousand software titles, providing the most complete online database of this kind.
Database last updated on 02/07/01
"A FANTASTIC Spyware Lookup Database Site" (Steve Gibson, GRC.com)
Spychecker.com has been Highly Recommended by IT Security Guru Steve

Spychecker displays the offending spyware and the developer's privacy statement, and lets you surf to the product's homepage for de-installing information.

It doesn't stop cookies or referrers, nor does it remove offending spycode from your hard drive. In fact, it doesn't really *do* anything—if "doing" means performing any action on your computer. So what good is it?

Consider this scenario: There's some retail software you'd like to buy, or maybe some shareware you'd like to download and try out, but you have no idea whether the product in question is just an innocent, useful piece of code, or something that will track your Internet footprints long after you've deleted the program. In comes *Spychecker* for a little reconnaissance.

Just type in the name of the suspect program in a small dialog box, and an online database of known and verified spyware is compared to your entry, alerting you to whether the code in question is indeed spyware. *Spychecker* is freeware, and because it's maintained online, there's no need to download updates (as is the case with most antivirus software). *Spychecker* is accurate too. Parent company Spychecker .com solicits database updates and verifies all suggestions before adding or deleting items from its database.

The one failing of *Spychecker* that we've noticed is its inability to acknowledge differences between versions of a given product. For instance, we know from personal experience that HeadLight Software's *Netware* downloading tool, *GetRight*, didn't employ spyware code in its 3.x release. Unfortunately, *Spychecker* can't distinguish between that version and *GetRight 4.x*, which uses both the Conducent/Timesink and Radiate Aureate spyware systems.

This, however, is a minor gripe, since most of the programs containing spyware aren't one-of-a-kind apps, and we'd just as soon download some other, equally useful shareware to audition rather than run some potential spyware. Are we paranoid? Nah. Remember, it isn't paranoia if they're really out to get you.

—Barry Brenesal

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- Strong filtering and privacy functionality
- Good interface
- Test URL for effective blocking on web site

MINUSES
- Weak help system with few comments and hyperlinks

Spychecker

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- All reported programs are checked for accuracy
- Easy to use

MINUSES
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- No program versions listed to indicate which are spyware-infested

AD-AWARE 4.5 — 9

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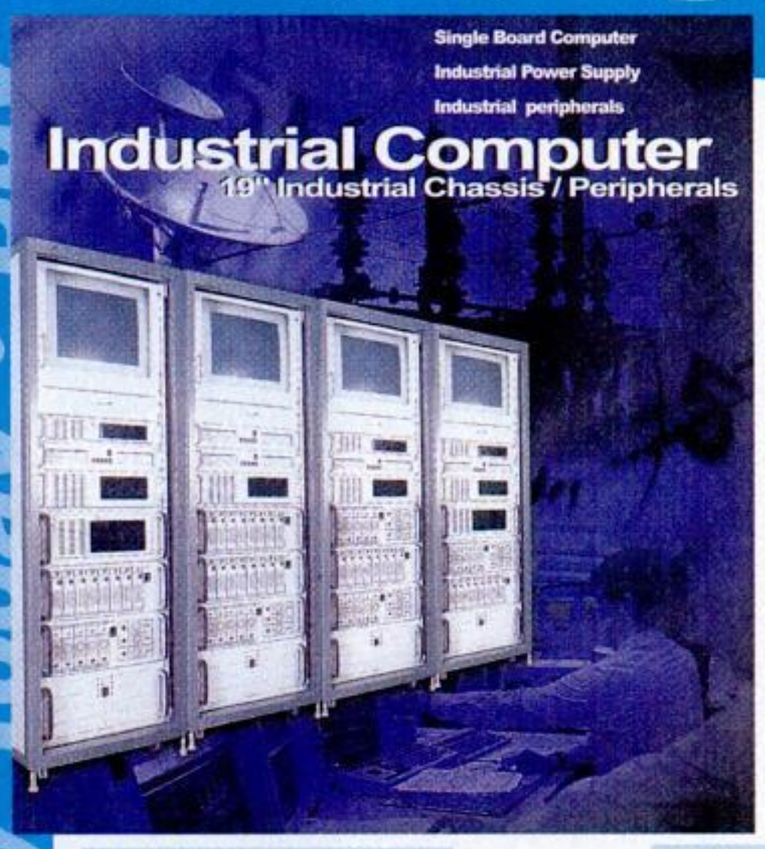

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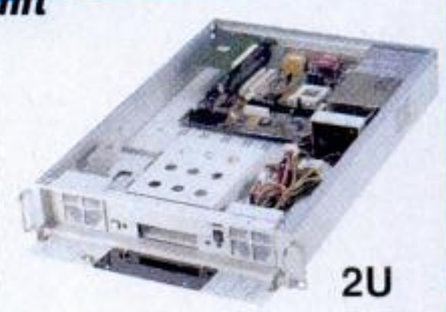

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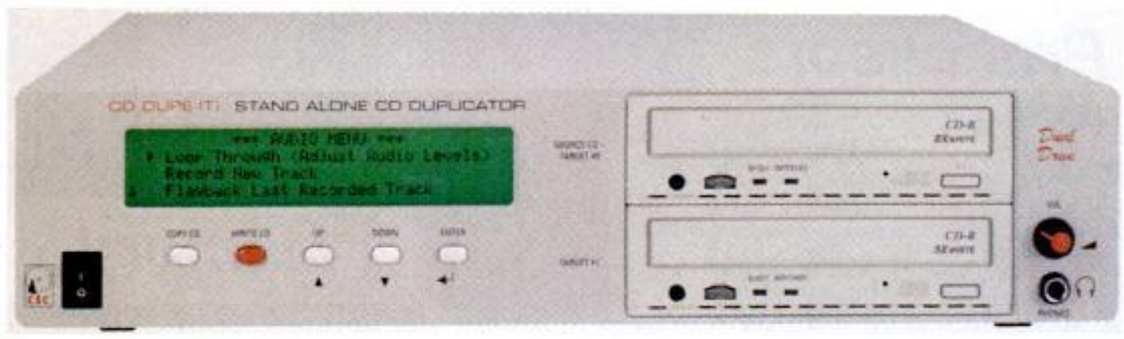

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Microsoft	www.microsoft.com	26
Misco Industries / Wolop.com	www.wolop.com	22
OnStream	www.onstream.com	7
PC Power & Cooling Inc.	www.pcpowercooling.com	17
Roxio (fomerly Adaptec)	www.roxio.com	28/29
Sony	www.sony.com/di	19
StarBand Communications, Inc.	www.StarBand.com	9
TDK	www.tdk.com	2/3
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Upgrade Source Corp.	upgradesource.com	93
Visa	www.visa.com	21
Voyetra / Turtle Beach	www.voyetra.com	62

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NEXT MONTH

In the May issue of MAXIMUM PC

Battle of the GAMING TITANS!

What are you really paying for when you buy a PC that's been expressly designed for high-performance gaming? We compare the world's most elite gaming machines across seven categories. Which one has the best videocard? Which has the best monitor? What about speakers, soundcards, and software bundles? Only the best shall survive!

How to Paint Your Case

Follow along step-by-step as we show you how to pick your favorite metallic-paint, prepare your case, apply the paint, and decal the whole kit-and-caboodle. Think your 1972 Plymouth Scamp looks trick? You haven't seen anything yet!

Test Your Geek Quotient

"I'm the king of the geeks!" declared Leonardo DiCachio while in the throes of an upgrading epiphany. Do you have enough PC smarts to unseat DiCachio or your local computer guru? Find out next month by taking our very special PC IQ test.

PC Pranks to Play on Your Pals

Case Study #34b: Place a simple strip of tape over your friend's mouse ball; hilarity ensues. And it only gets more diabolical (and more technically complex) from there. We recklessly present more PC mischief than allowed by law.

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- 59WHr Li-Ion Battery ■ harman/kardon® Audio
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- 128MB 100MHz SDRAM
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- Fixed 8X Max DVD-ROM Drive
- 4X AGP 32MB ATI Mobility™-M4 3D® Video
- Internal 56K Capable[6] FaxModem
- 59WHr Li-Ion Battery ■ harman/kardon® Audio
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- SoundBlaster 64V PCI LC Sound Card
- PC Speakers
- 56K Capable[6] PCI DataFax Modem
- MS® Works Suite 2001 ■ MS® Windows® Me
- 1-Yr Limited Warranty[2] ■ 1-Yr At-Home Service[4]
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- SoundBlaster 64V PCI LC Sound Card
- harman/kardon® Speakers
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- 48X Max CD-ROM Drive ■ SB Live! Value Digital
- Harman Kardon® HK-695 Surround Sound Speakers with Subwoofer
- Integrated 3Com® 10/100 Ethernet Controller
- MS® Works Suite 2001 ■ MS® Windows® Me
- 3-Yr Limited Warranty[2] ■ 1-Yr At-Home Service[4]
- 1 Year of DellNet™ by MSN® Internet Access[10] Included
- Family Game Pack[16]

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DELL™ DIMENSION™ 8100 Series

Cutting-Edge Performance

- Intel® Pentium® 4 Processor at 1.4GHz
- 128MB RDRAM
- 60GB[5] Ultra ATA/100 Hard Drive (7200 RPM)
- 19" (18.0" vis, .26dp) M991 Monitor
- 32MB DDR NVIDIA™ GeForce2 GTS 4X AGP Graphics
- NEW 16X Max DVD-ROM Drive
- Turtle Beach® Santa Cruz™ DSP Sound
- Harman Kardon® HK-695 Surround Sound Speakers with Subwoofer
- Integrated 3Com® 10/100 Ethernet Controller
- MS® Works Suite 2001 ■ MS® Windows® Me
- 3-Yr Limited Warranty[2] ■ 1-Yr At-Home Service[4]
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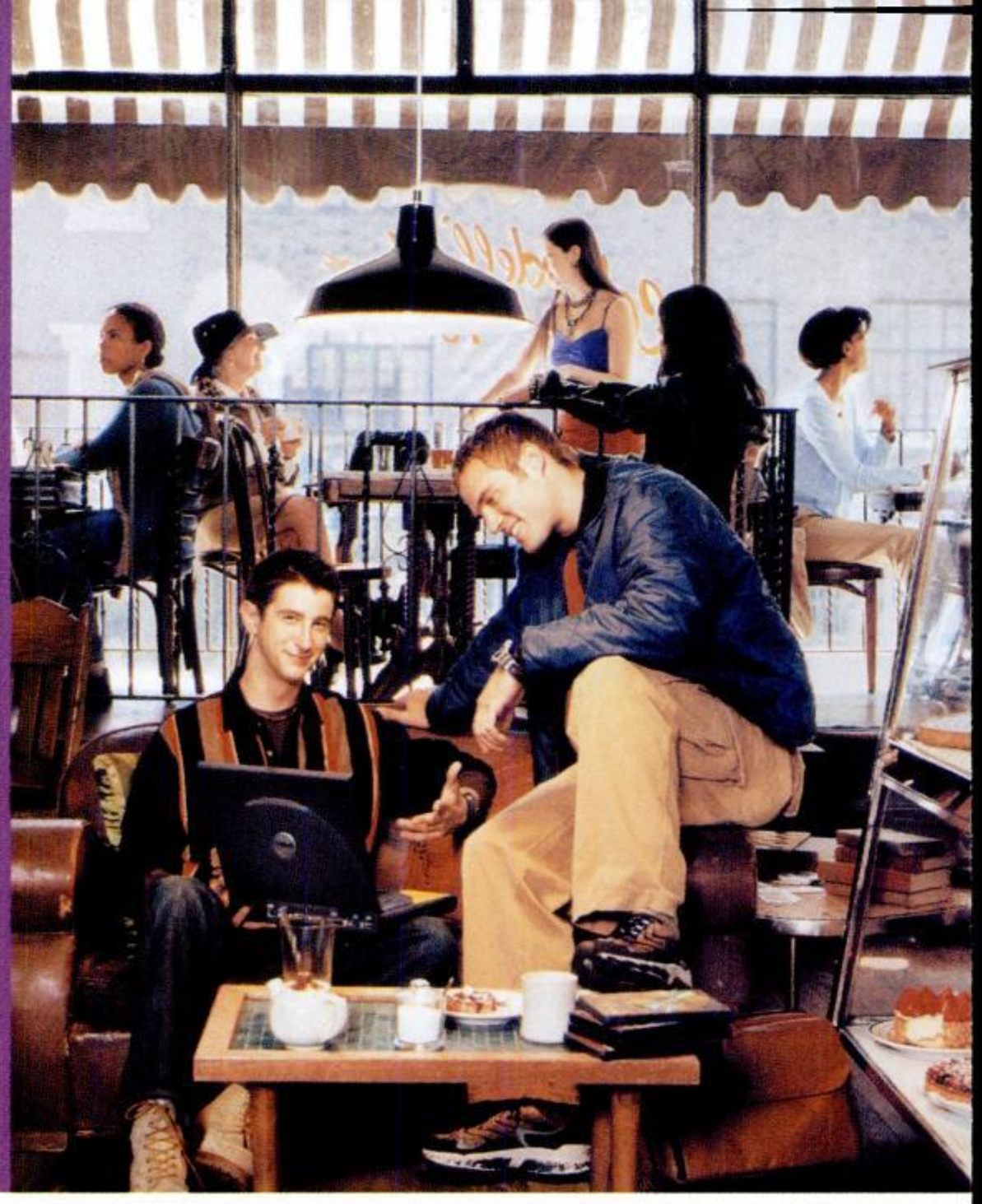

DELL™ INSPIRON™ 8000

Multimedia Mobile Desktop

- Intel® Pentium® III Processor at 800MHz
- 15" Super XGA+ TFT Display ■ 128MB 100MHz SDRAM
- 20GB[5] Ultra ATA Hard Drive
- Fixed 8X Max DVD-ROM Drive
- 4X AGP 32MB ATI Mobility™-M4 3D® Video
- Internal 56K Capable[6] FaxModem
- 59WHr Li-Ion Battery ■ harman/kardon® Audio
- MS® Works Suite 2001 ■ MS® Windows® Me
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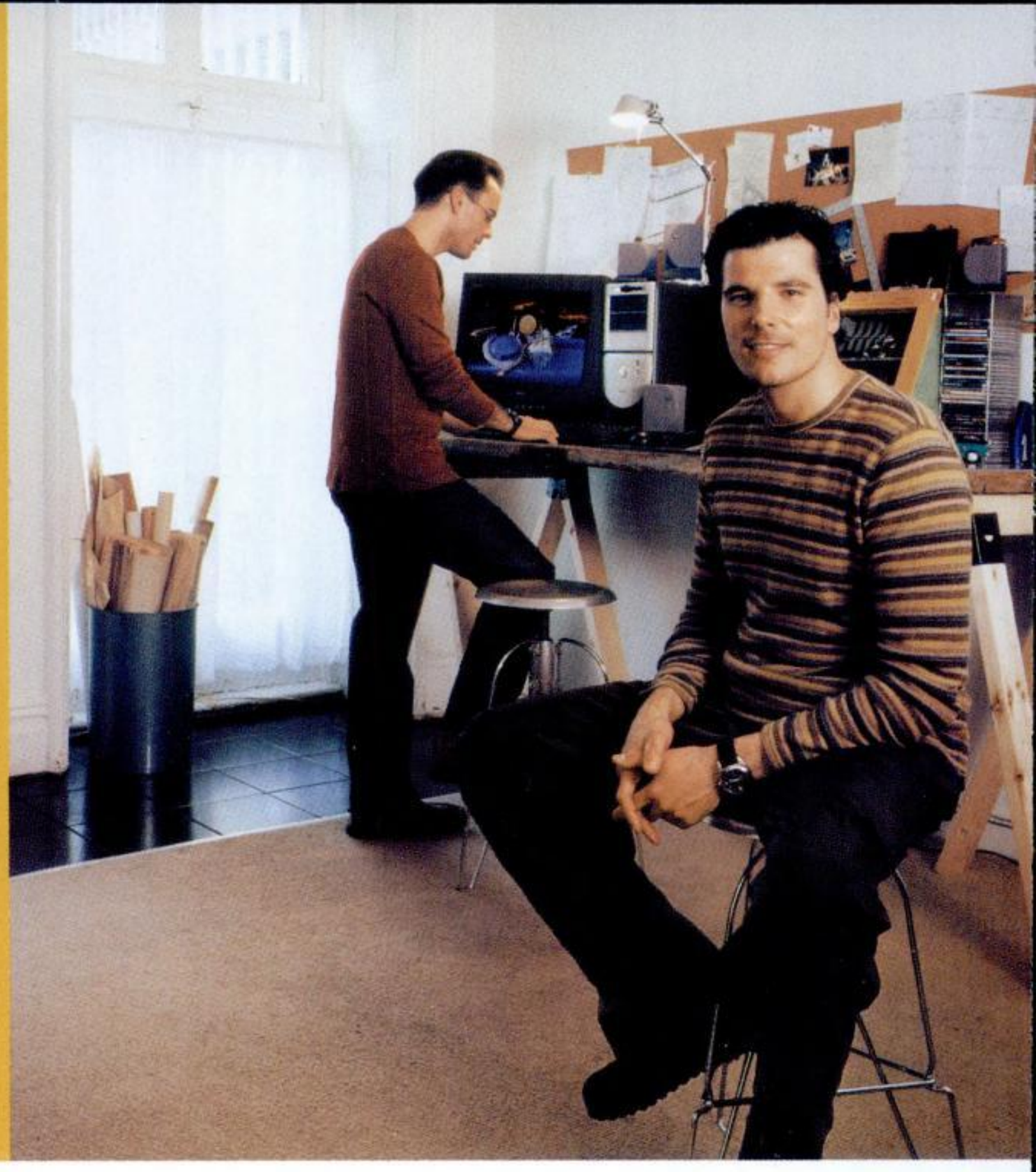

DELL™ DIMENSION™ 8100 Series

Cutting-Edge Performance

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- 32MB DDR NVIDIA™ GeForce2 GTS 4X AGP Graphics
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- MS® Works Suite 2001 ■ MS® Windows® Me
- 3-Yr Limited Warranty[2] ■ 1-Yr At-Home Service[4]
- 1 Year of DellNet™ by MSN® Internet Access[10] Included
- APC Pro8T2 SurgeArrest Surge Protector

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